U. S. Government

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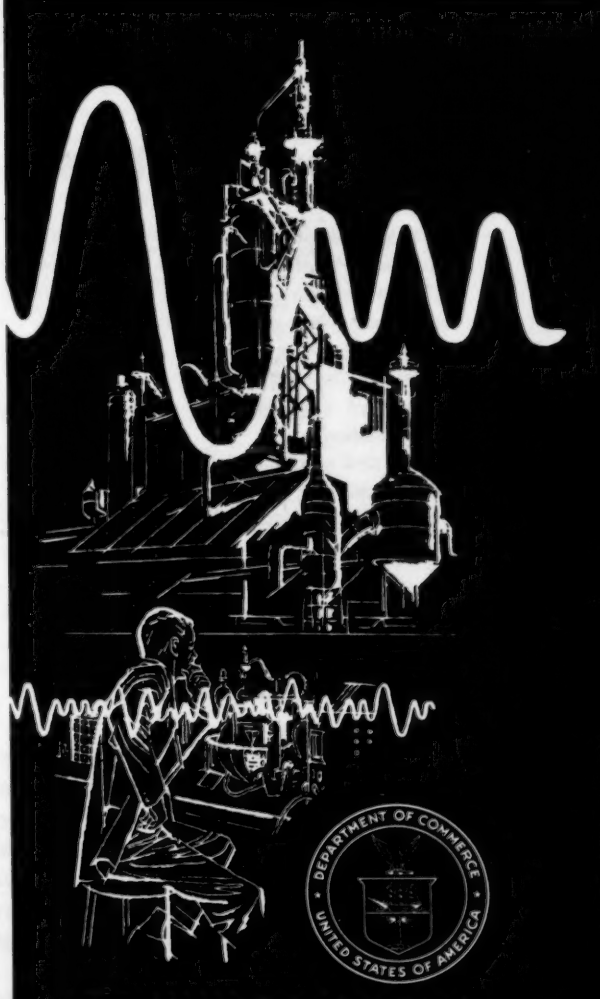

U. S. DEPARTMENT OF COMMERCE

Office of Technical Services

U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

OFFICE OF TECHNICAL SERVICES
Donald A. Schon, *Director*

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TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-426 766 Div. 1, 10
OTS price $7.60

Naval Ordnance Test Station, China Lake, Calif.
DEVELOPMENT AND QUALIFICATION OF ROCKET CATAPULT MK1 MOD 0 AND MK 2 MOD 0 (AIRCRAFT EJECTION SEAT) (RAPEC I AND RAPEC III),
by Donald Strietzel and Sydney Shefler. Dec 63, 68p.
NOTS TP3115; NAVWEPS 8085
Unclassified report

Descriptors: (*Ejection seats, Design), (*Cartridges (Pad), Explosive actuators), Ejection, Aviation injuries, Deceleration, Thrust, Acceleration, Performance (Engineering), Firing mechanisms, Igniters, Propellant grains, containers, Transportation, Captive tests, Test equipment, Tests, Environmental tests, Rocket propellants, Naval aircraft, Attack bombers, Jet bombers, Take-off, Landing.

Presented are the development, final qualification, and production of the Rocket Catapult Mk 1 Mod 0 and Mk 2 Mod 0 (Aircraft Ejection Seat), formerly known as RAPEC I and RAPEC III. A brief summary is given of the results of the final qualification tests conducted at various facilities. The Mk 1 Mod 0 and Mk 2 Mod 0 rocket catapults permit a pilot to eject safely during the hazardous ejection conditions at take-off, landing, and high speed at low altitude.

AD-426 783 Div. 1, 9
OTS price $6.60

Institute of Aerophysics, U. of Toronto (Canada).
PERFORMANCE AND OPERATION OF QUASI TWO-DIMENSIONAL JET FLAPS,
by G. K. Korbacher. Nov 63, 52p. Rept. 90
Grant DA TC44 177G1, Task 1D121401A14224
ATRECOM TR63 58 Unclassified report

Descriptors: (*Jet flaps, Aerodynamic control surfaces), (*Short take-off planes, Jet flaps), Two dimensional flow, Recovery, Thrust, Lift, Drag, Wings, Optimization, Angle of attack, Mathematical analysis, Aerodynamic characteristics, Fluid flow, Experimental data, Deflection, Aerodynamic configurations, Design, Theory, Velocity.

True two-dimensional and quasi two-dimensional jet-flap test results are evaluated for experimental evidence in favor or against the once much-disputed jet-flap thrust hypothesis. The thrust hypothesis is verified experimentally as conclusively as it has been proven theoretically. The development is presented of jet-flap characteristics for truly and quasi two-dimensional jet-flapped wings. For any desired lift, it renders any number of combinations of rate of blowing, jet-deflection angle, and angle of attack which can produce this lift. Besides, it permits that amount of the jet-sheet thrust which can be recovered as propulsive thrust or which is nullified by the drag of the jet-flapped wing to be read off simultaneously. The ratio of these values reflects on the performance and economy of operation of this wing. If then, the production of a specific lift is optimized with respect to the lowest expenditure in blowing at the smallest possible drag, an 'operating line' can be defined and added to the jet-flap 'characteristics'. The range of economical jet-flap operation was found to coincide with the region in which any change in the rate of blowing results in exactly the same change in the measured thrust. (Author)

AD-426 788 Div. 1
OTS price $2.60

Mississippi State U., State College.
THE MARVEL PROJECT. PART B. REPORT OF PRELIMINARY FLIGHT TESTING OF MARVELETTE XAZ-1,
by Glenn Bryant and Sean Roberts. Nov 63, 20p.
Aerophysics research rept. no. 46
Contract DA44 177AMC892, Task 1D121401A14203
ATRECOM TR63 66 Unclassified report

Descriptors: (*Research planes, Aerodynamic configurations), Flight testing, Shrouded propellers, Ring wings, Wings, Camber, Subsonic characteristics, Aerodynamic control surfaces, Design, Specifications.

An interim test-bed aircraft, the Marvelette, was built to evaluate functionally the compatibility of the various features of the Marvel design (boundary-layer control, cambered wing, ducted propeller, fiberglass structure). Also, the Marvelette, designated XAZ-1, will provide information for the refinement of the Marvel design and be a readily available laboratory for exploration of low-speed aerodynamics in flight. Pilot evaluation and flight data on the Marvelette are presented for the first ten aircraft checkout flights. (Author)

AD-426 872 Div. 1
OTS price $9.10

Human Sciences Research Inc., Arlington, Va.
HELICOPTER SURVIVABILITY AND OBSTACLE AVOIDANCE SYSTEMS. APPENDICES B AND C. THE CONTROL SYSTEM TASK AND DATA REQUIREMENTS MODES OF FLIGHT,
by M. D. Havron, D. L. Watters and B. C. Allnutt. Sep 62, 1v. Rept. no. HSR RR62 6 PeX
Unclassified report

Subcontract to Bell Helicopter Co., Fort Worth, Texas, Contract Nonr167000.

Descriptors: (*Helicopters, Flight control systems), (*Flight control systems, Helicopters), Flight instruments, Human engineering, Low altitude, Display systems, Terrain avoidance, Flight paths, Tactical warfare, Survival.

Contents: The control system task and data requirements - The helicopter as a system; Control

of the helicopter in straight and level flight; Control of the helicopter in obstacle avoidance flight; Task and information requirements for flight over an obstacle; Modes of flight.

AD-426 933 Div. 1, 30
OTS price $9.10

Army Transportation Research Command, Fort Eustis, Va.
HELICOPTER VIBRATION INDICATOR,
by Frank S. Kawalkiewicz, Eugene V. Warner, Jr., James M. Seibert and John E. Hempstead. Oct 63, 101p.
Task 9R38 01 017 41
TRECOM TR63 44 Unclassified report

Descriptors: (*Helicopters, Flight instruments), (*Flight instruments, Vibration), (*Warning systems, Vibration), Aviation safety, Flight testing, Data, Aircraft equipment, Test methods, Circuits, Weight, Detection.

A requirement exists for a system to detect and alert helicopter pulots to unsafe vibration levels. Five helicopter vibration indicator (HVI) units were evaluated by installing each in one H-21-type helicopter (in lieu of five separate H-21's) in order to obtain comparative data. Results indicated that the helicopter vibration indicators, as designed, were unsuitable for Army helicopter utilization. (Author)

AD-426 975 Div. 1
OTS price $23.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE DESIGN OF AIRCRAFT (Proyektirovaniye samoletov. Opredeleniye Vesa. Komponovka. Vybor Skhemy i Osnovnykh Parametrov),
by N. A. Fomin. 12 Dec 63, 447p.
FTD TT62 913 Unclassified report

Trans from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, pp. 1-362, Moskva 1961.

Descriptors: (*Aircraft, Design), (*Textbooks, Aircraft), Aerodynamic characteristics, Mathematical models, Turbojet engines, Turbopropeller jet engines, Weight, Airframes, Aerodynamic configurations, Aircraft equipment, Wings, Fuselages, Tails (Aircraft), Aircraft industry, Ailerons, Flaps, Flight control systems.

Contents: General Design Work for Aircraft (Brief historical survey of the development of the basic flight characteristics, parameters, and design of aircraft; Influence of various parameters on basic flight characteristics of aircraft; Aircraft design, analysis and selection of design; Determination of basic aircraft parameters; Selection of engines for powerplant of aircraft; Assembly and centering of aircraft--Over-all aspects of the aircraft; and Economics of aircraft building and aircraft design); Designing the parts of the airplane (General fundamentals of design for parts of aircraft; Designing the wing; Designing the fuselage; Design of tail assembly; Design of landing gear; Designing the airplane's controls; and Problems to be encountered in further development of the contemporary aircraft and improvement of methods for designing it); and Appendices (Standard weight summary; Formulas used in calculations to determine basic parameters of aircraft with TRD (Jet engines); Major statistical data for contemporary aircraft; and Basic flight characteristics and parameters of best-known aircraft over the period from 1913 through 1955).

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-426 506 Div. 2
OTS price $4.60

United ElectroDynamics, Inc., Alexandria, Va.
WEATHER-SEISMIC-NOISE CORRELATION STUDY.
Semi-annual rept., 1 June-30 Nov 63,
by J. C. Bradford. 19 Dec 63, 1v.
Contract AF19 628 230
Unclassified report

Descriptors: (*Seismic waves, Wind), Meteorological instruments, Anemometers, Wind direction indicators, Correlation techniques.

The optimal design of seismic arrays and the optimal processing of the data therefrom requires knowledge of the cross power spectra of the noise between pairs of seismometers within the array. The usual practice for obtaining these cross spectra begins by assuming a model for the seismic noise. It is shown that relatively simple source patterns of seismic noise may produce noise traces that are apparently random in nature. Simple experiments designed to gain further insight into the nature of wind generated seismic noise show some promise of developing improved noise models. (Author)

AD-426 529 Div. 2
OTS price $4.60

Texas Instruments, Inc., Dallas.
OCEAN-BOTTOM SEISMOMETER DATA COLLECTION AND ANALYSIS.
Semi-annual technical rept. no. 5, 1 Apr-1 Oct 63,
by P. J. Farrell. 14 Nov 63, 1v.
Contract AF19 604 8368, ARPA Order 292 62
Unclassified report

Original contains color plates; all DDC reproductions will be in black and white. Original may be seen in DDC Hq.

Descriptors: (*Ocean bottom, Seismographs), Signal-to-noise ratio, Seismic waves, Noise, Ocean bottom sampling.

A total of 300 hours of ocean-bottom seismic data have been collected in areas off the California Coast and north and south of the Aleutian Chain in varying water depths to 20,000 ft. Refraction data of Pn arrivals recorded at Adak and on the ocean bottom (from 1000-lb explosive sources in water) yield an average 8.5 Km/second velocity which may be attributed to crustal thickening in the vicinity of the Aleutian Chain. Detailed analyses of a near-regional event recorded simultaneously on land and on the ocean bottom in the vicinity of Cape Mendocino, California, show signal-to-noise ratios on land and ocean bottom are comparable with enrichment of the high frequencies on the ocean bottom. The phases are better defined and developed on the ocean bottom than on land. Analyses of land and ocean-bottom noise samples in the California area indicate that at the microseismic peak the ocean-bottom average noise power levels are 20 db greater than at a nearby land station. Both the land and ocean-bottom noise spectra show little variation with time for the samples investigated, and their sources appear to be distributed in azimuth. (Author)

AD-426 544 Div. 2
OTS price $9.10

Texas Instruments, Inc., Dallas.
TERRAIN QUANTIFICATION. PHASE II. PLAYA AND MISCELLANEOUS STUDIES.
Final rept.,
by Donald D. Carr, Ronald E. Becker and Jack R. Van Lopik. 6 Oct 63, 73p.
Contract AF19 628 2786, Proj. 7628, Task 762805
AFCRL 63 793 Unclassified report

Descriptors: (*Terrain, Mapping), Geometry, Measurement, Analysis, Aerial photography, Classification.

This report presents results of work conducted as a continuation of the program described in 'Terrain Quantification, Phase I: Surface Geometry Measurements'. Field investigations were undertaken to test militarily significant techniques for mapping terrain factors in a desert environment characterized by playas and related landforms. This was supplemented by office studies concerned with: (a) 'state-of-the-art' methods for measurement and classification of microrelief; (b) extrapolation of surface geometry parameters from smaller to larger map scales; and (c) landform analysis by application of microdensitometer measurements on aerial photographs. Conclusions, though tentative in nature, point up the lack of any suitable technique or system for microrelief classification and indicate that areal slope distributions determined from contour maps are not satisfactory as index properties of surface geometry. The conceptual basis for a new terrain sampling method is discussed. (Author)

AD-426 673 Div. 2
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CONTOUR OF LUNAR BOUNDARY ZONE,
by A. A. Gorynya and V. K. Drofa. 5 Dec 63, 11p.
FTD TT63 982 Unclassified report

Trans. from Izd-vo AN Ukrainskoy SSSR, Glavnaya Astronomicheskaya Observatoriya, Kiyev, pp. 1-8, 1962.

Descriptors: (*Astronomical data, Curved profiles), (*Lunar environment, Astronomical data), (*Moon, Astronomy), Rotation, Motion, Meteorological charts, Astronomical observatories, Mathematical analysis, Configuration, Extraterrestrial topography, Astronomical cameras.

The report contains values of lunar deviations from the most reliable circumferences, representing the visible disk of the Moon, results of investigating the dependence of the radius upon eptical libration in latitude and upon the blackening of the photos. This data can be used for compiling charts of the Lunar boundary belt. (Author)

AD-426 681 Div. 2, 9
OTS price $4.60

Army Electronics Research and Development Activity, White Sands Missile Range, N. Mex.
TURBULENCE CHARACTERISTICS OF THE FIRST 62 METERS OF THE ATMOSPHERE,
by Frank V. Hansen. Dec 63, 44p.
Task 1A0 11001B021 10
AERDA 100 Unclassified report

Descriptors: (*Atmospheric motion, Turbulence), (*Earth, Turbulent boundary layer), Wind, Meteorological parameters, Shear stresses, Friction, Velocity, Drag, Stability, Temperature, Meteorology, Low altitude.

Turbulent characteristics of the first 62 meters of the atmosphere in the vicinity of the U. S. Army Electronics Research and Development Activity's Meteorological Research Tower are established for neutral conditions. The assumption was made that the roughness length is a constant, but dependent upon wind direction, fetch, and the height of the roughness elements. Data are presented for five recording periods during the late winter and early spring of 1958 and 1961. Computations of the basic wind profile and turbulence parameters are presented in tabular form. (Author)

AD-426 686 Div. 2, 8
OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
SOLAR FLUX MEASUREMENTS AT 915 Mc DURING PARTIAL ECLIPSE OF 20 JULY 1963,
by Richard J. Miner. Oct 63, 16p.
Proj. 4603
AFCRL 63 796 Unclassified report

Descriptors: (*Extraterrestrial radio waves, Solar eclipses), (*Solar eclipses, Extraterrestrial radio waves), Measurement, Radio astronomy, Parabolic antennas, Telescopes, Solar radiation.

Measurements of solar flux were made at L. G. Hanscom Field at 915 Mc during the solar eclipse of 20 July 1963. A 95% optical eclipse occurred at Hanscom Field. Data of the day of the eclipse and the day after are presented. An eclipse of 85.6% of the solar flux was observed. Two areas of high solar flux radiation are identified near the limbs of the sun from the rate of change of the received flux during the eclipse. A calculation of true solar flux is made. A series of photographs are displayed which were made using a six-inch reflector optical telescope. Observations were made at other frequencies by the Space Physics Laboratory. (Author)

AD-426 717 Div. 2
OTS price $5.60

RAND Corp., Santa Monica, Calif.
SIMPLE MODELS OF THERMALLY DRIVEN MESOSPHERIC CIRCULATION,
by Conway Leovy. Jan 64, 50p. Rept. no. P2847
Unclassified report

Descriptors: (*Atmosphere models, Upper atmosphere), Numerical analysis, Atmospheric motion, Photochemistry, Thermal conductivity, Viscosity, Damping, Hydrostatics, Polynomials, Meteorological parameters.

Possible thermally driven symmetric circulations of the mesosphere and upper stratosphere are considered, subject to the following major assumptions: The motions are in hydrostatic and geostrophic balance, the motions are small perturbations about a state of rest which is defined by the horizontal average of the radiative equilibrium temperature, the eddy fluxes of momentum and heat act only as Rayleigh friction and Newtonian conductivity, or as vertical eddy viscosity and conductivity. The assumption of small perturbations is justified by consideration of photochemical and radiative processes. The derived meridional circulations have a principal flow branch from summer pole to winter pole with maximum amplitude less than one meter per second. Good agreement with the observed amplitude,

distribution, and seasonal phase of the mean zonal winds is obtained if eddy viscosity and eddy conductivity parameters are assumed to be about 500 sq m/s. Radiative and photochemical processes are found to have an important damping effect on motions of this type; a radiative-photochemical damping parameter can be derived having the order of magnitude 10 to the -6th power per second. (Author)

AD-426 812 Div. 2
OTS price $2.60

Pennsylvania State U. Mineral Industries Experiment Station, University Park.
PHYSICAL MECHANISMS OF CLEAR-AIR TURBULENCE,
by H. A. Panofsky and J. C. McLean, Jr.
1 Oct 63, 20p. SR1
Contract CWB1039
Unclassified report

Descriptors: (*Air, Turbulence), (*Wind, Air mass analysis), Temperature, Shear stresses, Vortices, Heat transfer.

An attempt was made to test the hypothesis that reports of clear-air turbulence (CAT) on March 14-15, 1962, were associated with narrow layers (upper fronts) in which the Richardson numbers are small. The test was carried out with the aid of original soundings of temperature and wind. The data did not contradict the hypothesis, as many reports of CAT were made in sloping baroclinic or adiabatic layers. In any case, the Richardson numbers were generally low. Complete confirmation and establishment of a firm 'critical' Richardson number requires better vertical resolution of wind. An index of CAT intensity which should be proportional to the energy of CAT is derived from the eddy energy equation. (Author)

AD-426 828 Div. 2, 30
OTS price $1.10

Redstone Scientific Information Center, Redstone Arsenal, Ala.
AN EXPERIMENT ON THE STRAIN OF SONDE ANEROID BAROMETER.
13 Dec 63, 5p.
RSIC 110 Unclassified report

Trans. from Jnl. of Meteorological Research, Vol. 10, pp. 70-72, 1958.

Descriptors: (*Radiosondes, Strain (Mechanics)), (*Barometers, Measurement), Oscillators, Meteorological instruments, Manometers. Temperature, Pressure, Tables, Time.

AD-426 875 Div. 2
OTS price $5.60

Aracon Geophysics Co., Div., of Allied Research Associates, Inc., Concord, Mass.
FLEET APPLICATIONS METEOROLOGICAL OPERATIONAL SATELLITES (TROPICS-EASTERLY WAVES).
Final rept.,
by Earl S. Merritt. Dec 63, 45p. Rept. no. ARA F9252 2
Contract N189 188 56897A
Unclassified report

Descriptors: (*Meteorological satellites, Weather stations), (*Weather forecasting, Meteorological satellites), (*Clouds, Pattern recognition), (Atmospheric motion), Atmosphere models, Trosphere, Cloud cover, Air mass analysis, Vortices, Tropical cyclones, Upper atmosphere, Measurement, Climatology, Photogrammetry, Photographic reconnaissance.

Analyses of tropical perturbations in the Atlantic Region (commonly referred to as easterly waves), utilizing observations from meteorological satellites, reveal that five distinctly different cloud distributions occur. These patterns are both linear (similar to the classic Riehl model of the easterly wave) and vortical. The vortical patterns appear most frequently and are often related to a closed cyclonic circulation in the mid-troposphere. Calculations of the horizontal and vertical distribution of divergence and vorticity which are indicative of a mid-troposphere circulation in an intense disturbance are shown. (Author)

AD-426 945 Div. 2, 6, 14
OTS price $2.60

Stanford Research Inst., Menlo Park, Calif.
MEASUREMENT OF NITRIC OXIDE IN THE EARTH'S ATMOSPHERE.
Final rept.,
by Robert A. Young. 22 July 63, 23p.
Contract DA49 146XZ112, SRI Proj. PAU3895
DASA 1419 Unclassified report

Descriptors: (*Earth, Atmosphere), (*Nitrogen compounds, Measurement), Oscillators, Electrostatics, Oxides, Electrodes, Excitation, Radiofrequency, Detectors, Vacuum apparatus, Transport properties, Diffusion, Turbulence, Plasma sheath, Gas ionization, Test methods, Flash lamps, Microwave equipment, Recombination reactions, Oxygen, Nitrogen, Gases.

AD-426 946 Div. 2
OTS price $3.60

Naval Air Station, Norfolk, Va.
AN EXAMINATION OF THE DISTRIBUTION OF HURRICANE FORECAST ERRORS USING PROBABILITY ELLIPSES.
Oct 63, 29p.
NWRF 12 1063 81 Unclassified report

Descriptors: (*Tropical cyclones, Distribution), (*Weather forecasting, Errors), Statistical analysis, Probability, Ellipsoids, Storms, Classification.

The fact that tropical cyclones move in erratic, apparently unpredictable paths has been recognized by navigators and meteorologists for over half a century. The advent of the international ship reporting system late in the 19th century and aircraft reconnaissance during World War II have created advancements in the tracking of these storms; concurrently, improvements have been made in forecasting storm movement. No presently known technique, however, yield the consistent desired degree of accuracy. Research currently being conducted indicates that the problem of forecasting storm movement is so complex that it may require many years of research and large expenditures before 'pin point' accuracy may be expected in the forecasts. It must, then, be anticipated that the official warnings will contain errors. Records of forecast errors provide a source of information from which the nature of the expected forecast errors may be deduced in order that fleet commanders may better ''live'' with the errors made. (Author)

AD-426 972 Div. 2
OTS price $23.50

Naval Oceanographic Office, Washington, D. C.
ARCTIC ICE,
by N. N. Zubov. 1963, 491p.
Unclassified report

In cooperation with American Meteorological

Society, Boston, Mass.

Descriptors: (*Ice islands, Polar regions), (*Polar regions, Ice), Sea water, Salinity, Temperature, Oceans, Oceanology, Ocean currents, Ice formation indicators, Physical properties, Chemical properties, Deformation, Melting, Tides, Wind, Drift.

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

No Entries

4. CHEMISTRY

AD-426 528 Div. 4, 25
OTS price $7.60

American Cyanamid Co., Stamford, Conn.
CHEMILUMINESCENT MATERIALS.
Technical rept. no. 2, 1 Sep-30 Nov 63.
30 Nov 63, 75p.
Contract Nonr420000, ARPA Order 299, Task NR356 452
Unclassified report

Descriptors: (*Luminescence, Chemistry), (*Fluorescence, Chemistry), (*N-heterocyclic compounds, Luminescence), (*Polycyclic compounds, Luminescence), (*Excitation, Luminescence), Emissivity, Quantum mechanics, Chemical reactions, Decomposition, Free radicals, Organic nitrogen compounds, Polymers, Hydrogen peroxide, Peroxides, Carbonyl radicals (Groups), Chlorine compounds, Synthesis (Chemistry), Reaction kinetics, Dyes, Electrons, Spin, Resonance, Life expectancy.

Apparatus for measurement of chemiluminescent and fluorescent quantum yields was fully calibrated. A quantum yield of 6% was measured for an improved oxalyl chloride system, and 1% for several 3-aminophthalhydrazide systems. A route to a chemiluminescent polymer appears to have been found. Three new synthetic approaches are in progress; two of which involve routes to compounds which should eject N in an energy producing step. A new route designed to lead to a highly fluorescent 3-aminophthalhydrazide derivative is reported. Studies of the 3-aminophthalhydrazide reaction suggest that the first step involves a one electron oxidation to produce a radical intermediate which reacts with oxygen or a peroxy radical to give peroxidic chemiluminescent precursors or can lose another electron to produce a non-luminescent material. (Author)

AD-426 539 Div. 4
OTS price $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
DISTILLATION OF BERYLLIUM BY SUBLIMATION AND EVAPORATION.
Interim rept., 15 Aug-30 Nov 63,
by G. London and M. Herman. 30 Nov 63, 11p.
Rept. no. I B2122 1
Contract AF33 657 11233
Unclassified report

Descriptors: (*Beryllium, Distillation), Purification, Sublimation, Evaporation, Zone melting, Low pressure research, Rods, Chemical analysis.

The purpose of this program is to prepare high purity beryllium by volatilizing it without the use of a containing crucible and under high vacuum conditions. This method is conceived as an improvement on the already developed technique of distilling beryllium onto a heated condensing surface. Specifically, the improved method is designed to minimize the oxygen pick-up felt to be present during distillation with a BeO crucible. The technique includes both liquid and solid state distillation of the beryllium to be purified. The product obtained will be used for chemical analytical purposes. Initial efforts toward developing a system suitable for distillation studies consisted of evaluating the conditions for melting the end of a 1 inch diameter bar held vertically in a sealed quartz chamber. This was changed to the technique of using a water-cooled copper pedestal to support and stabilize a slug of molten beryllium. The water-cooled copper pedestal melting equipment is now being used for the collection and analysis of vacuum deposited beryllium metal under a variety of operating conditions. (Author)

AD-426 566 Div. 4
OTS price $1.10

Fordham U., New York.
SMALL RING COMPOUNDS.
Final rept., 1 Oct 61-30 Sep 63,
by Emil J. Moriconi. 15 Nov 63, 6p.
Grant AF AFOSR62 18
AFOSR J1369 Unclassified report

Descriptors: (N-heterocyclic compounds, Synthesis (Chemistry)), (*Polycyclic compounds, Synthesis (Chemistry)), (*Ketones, Synthesis (Chemistry)), Chemical reactions, Ozone, Aromatic compounds, Nuclear magnetic resonance, Oxidation, Photochemistry, Pyrolysis, Monocyclic compounds, Oxygen compounds.

Contents:
Ring expansion reaction
Heteropolar Ozonization of Aza-aromatics and their N-oxides
Origin of the carbonyl doublet in 2-indanone and trans-Hexahydro-2-indanone
NMR studies of N-hydroxy-2-pyridone $\rightleftarrows$ 2-hydroxypyridine-1-oxide equilibria
Synthesis of fused aza-aromatic cyclobutadiene derivatives; quinoxalino-[2,3-c] cyclobutadiene
Synthesis of strained azabicyclooctanes; 7- and 2-azabicyclo [4.2.0] octanes
Fused-ring aromatic azetes. 3-diazooxindoles and 2-diazoindoxyls
Valence tautomerism of the aza-cyclooctatriene ring system

AD-426 567 Div. 4
OTS price $1.10

Yale U., New Haven, Conn.
MOLECULAR FRAGMENTS IN SHOCK WAVES.
Final rept., 1 Nov 60-31 Oct 62,
by R. S. Berry. 30 Oct 63, 5p.
Grant AFOSR61 25
AFOSR J1376 Unclassified report

Descriptors: (*Absorption spectrum, Halides), (*Molecular spectroscopy, Halogens), Shock waves, Alkali metal compounds, Molecular structure, Ions, Benzenes (Radical), Chromium, Benzenes (Disubstituted), Polarization, Dissociation, Gases, Physical chemistry.

The possibility of observing absorption spectra of free, gaseous negative ions like chloride or

bromide was investigated. The technique proposed was the vaporization and dissociation of alkali halides by a shock wave, followed by short duration absorption spectroscopy. The shock wave method was selected because of its flexibility and relative simplicity. The photodetachment spectra, continuous absorption spectra were obtained for chlorine, bromine, and iodine. From these spectra, precise values of the halogen electron affinities were obtained. The fluoride spectrum was also obtained. It was possible to make preliminary estimates of the photo detachment cross sections for the various halogens, which are probably within 50% of the true values. Dehydroaromatic molecules were also studied, and benzyne (1,2-dehydrobenzene) in particular. The method of flash photolysis with flash spectroscopy was applied to three known precursors of benzyne: benzenediazonium-2-carboxylate, o-iodophenyl mercuric iodide and di-o-iodophenyl mercury. Chemical products were strongly indicative of the presence of gaseous benzyne, and a transient broad continuous absorption spectra was obtained which has been assigned to benzyne. A peripheral problem of interest was the spectrum and electronic structure of dibenzene chromium. (Author)

AD-426 568 Div. 4
OTS price $1.10

Northwestern U., Evanston, Ill.
SYNTHESIS, PROPERTIES AND REACTION MECHANISMS OF PLATINUM METAL COMPOUNDS.
Final rept., 15 Sep 58-31 Aug 63,
by Fred Basolo. 15 Nov 63, 6p.
Contract AF49 638 315
AFOSR J1366 Unclassified report

Descriptors: (*Complex compounds, Synthesis (Chemistry)), (*Ammonia, Complex compounds), (*Transition elements, Complex compounds), (*Gold compounds, Complex compounds), (*Amines, Complex compounds), Reviews, Cobalt compounds, Rhodium compounds, Indium compounds, Platinum compounds, Carboxylic acids, Nitrates, Molecular isomerism, Halogen compounds, Chemical properties.

Research on the chemistry of metals called noble or platinum metals is reviewed: (1) New Linkage Isomers. Making use of studies on the mechanism of formation of the Co(III) linkage isomers [(NH3)5Co-ONO](2+) (nitrito) and [(NH3)5Co-NO2](2+) (nitro), analogous isomers for Rh(III), Ir(III) and Pt(IV) were synthesized and studied. (2) Chloroamminerhodium(III) Complexes. Several new complexes of Rh(III) were prepared and kinetic study made of their acid and base hydrolysis. (3) Carboxylatopentamminemetal(III) Complexes. Compounds of the type [M(NH3)5(RCOO)](2+), where M=Co(III), Rh(III), Ir(III) and RCOO(-)= CH3COO(-), (CH3)3CCOO(-), CF3COO(-), where synthesized. Kinetic studies show that the rate of hydrolysis of these complexes is acid catalyzed. (4) (Acidoamminegold(III) Complexes. Solution chemistry of the new compounds [Au(dien)X]X (where dien = NH2CH2CH2NHCH2CH2NH2 and X = Cl(-), Br(-), I(-)) was investigated in some detail. (Author)

AD-426 571 Div. 4, 25
OTS price $5.60

Johns Hopkins U., Baltimore, Md.
HOT ATOM CHEMISTRY.
Final rept.,
by Walter S. Koski. Oct 63, 1v.
Contract AF49 638 481
AFOSR J1377 Unclassified report

Descriptors: (*Ions, Chemical reactions), (*Molecules, Ion bombardment), (*Helium group gases, Chemical reactions), (*Nitrogen, Ion beams), (*Bromine, Ion beams), (*Ion bombardment, Chemical reactions), Ammonia, Hydrazine, Deuteron bombardment, Carbon compounds, Chlorine compounds, Mass spectroscopy, Energy, Chromatographic analysis, Alkanes, Isotopes, Synthesis (Chemistry), Solidified gases.

Contents: Introduction; Rare gas ion reactions with ammonia; Gas phase reactions between carbon tetrachloride and mass analyzed ions of N between 3 and 200 ev; and Positive bromine ion bombardment of solid butane and benzene.

AD-426 575 Div. 4
OTS price $1.60

Kansas U., Lawrence.
MECHANISM OF INORGANIC REACTIONS: BRIDGE MECHANISM IN ELECTROCHEMICAL OXIDATION AND REDUCTION OF METAL IONS.
Final rept., 1 Oct 61-31 Dec 62,
by Reynold T. Iwamoto. 11 Nov 63, 3p.
Grant AFOSR61 8
AFOSR J1367 Unclassified report

Descriptors: (*Complex compounds, Electrochemistry), (*Electrochemistry, Scientific research), (*Scientific research, Electrochemistry), Copper compounds, Nickel compounds), Oxidation-reduction reactions, Ions, Solutions, Organic solvents, Chemical reactions, Polarographic analysis.

The following report covers research from June 1, 1961 to December 31, 1962. To obtain information fundamental to understanding the mechanism of inorganic oxidation-reduction reactions, in particular of those involving a bridged activated complex, use of nonaqueous solvents and of an electrode was proposed. An investigation of various carboxylic acids as electron mediators in inorganic electrochemical oxidation-reduction reactions was begun. A reaction between Cu (II) ion and Cu metal in acetic acid was uncovered. When Cu metal is added to an acetic acid solution of Cu (II) perchlorate, the color of the solution was found to change almost immediately from a pale blue to an intense violet. The purple product was isolated and contains a Cu (II) and a Cu (I) ion. A study of the polarographic behavior of Ni (II) in acetonitrile in the presence of chloride was made to obtain information on how the coordination sphere around an ion influences behavior of the ion in solution. One of the important problems in the studies on the nature and behavior of inorganic ions in nonaqueous media is the effect of residual water. Formation constants of aquo-copper (II) complexes in acetone were investigated and prepared for publication. (Author)

AD-426 666 Div. 4
OTS price $.50

National Carbon Co., Inc., Cleveland, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXVIII. POLAROGRAPHIC REDUCTION OF POLYNUCLEAR AROMATICS,
by I. C. Lewis, H. Leibecki and S. L. Bushong.
Nov 63, 10p.
Contract AF33 616 6915, Proj. 7350 and 7381,
Task 735002 and 738102
WADD TR61 72, vol. 28
Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Hydrocarbons, Polarographic analysis), (*Polycyclic compounds, Polaro-

graphic analysis), (*Aromatic compounds, Polarographic analysis), Pyrolysis, Ionization potentials, Amides, Organic solvents.

Polarographic reduction potentials have been measured for polynuclear aromatic hydrocarbons and their parameters for structurally similar hydrocarbons have been related to the positions of the respective long wavelength p bands. Polarographic reduction potentials have also been determined for a series of substituted pyrenes and anthracenes. Polarographic reduction potentials are shown to relate to the electronic effect of the substituent group. The application of polarography to the characterization of aromatics in complex pyrolytic residues is discussed. (Author)

AD-426 718 Div. 4, 15, 25
OTS price $5.60

RAND Corp., Santa Monica, Calif.
MASS ACTION LAWS AND THE GIBBS FREE ENERGY FUNCTION,
by N. Z. Shapiro and L. S. Shapley. Dec 63, 52p.
RM3935PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Chemical equilibrium, Mathematical analysis), Chemical reactions, Quantitative analysis, Linear systems, Nonlinear systems, Algebras, Pathology, Physiology, Functions.

Contents: The Chemical System, The Mass Balance Laws, Reaction Vectors and the Stoichiometric Conditions, The Mass Action Laws, The Gibbs Free Energy Function, Notation, Quasi-dependence, Properties of the Free Energy Function, The Minimum Set of the Free Energy Function, Relation to the Mass Action Laws, The Possible Minimum Sets, and Examples of Special Cases of Interest.

AD-426 854 Div. 4
OTS price $1.25

Manchester U. (Gt. Brit.).
RESEARCH ON PROBLEMS OF RESTRICTED ROTATION RELEVANT TO INORGANIC POLYMERS.
Final summary rept., 1 Oct 60-31 May 63,
by Michael F. Lappert. Nov 63, 43p.
Contract AF61 052 441, Proj. 7340, Task 734004
ASD TDR62 942, pt. 2 Unclassified report

Descriptors: (*Boron, Chemical bonds), (*Nitrogen, Chemical bonds), (*Amines, Nuclear magnetic resonance), (*Organoboranes, Nuclear magnetic resonance), (*Nuclear magnetic resonance, Chemical bonds), (*Chemical bonds, Nuclear magnetic resonance), Organic nitrogen compounds, Alkanes, Aromatic compounds, Chlorine compounds, Bromine compounds, Stability, N-heterocyclic compounds, Phosphorus, Organic phosphorus compounds, Molecular isomerism, Reaction kinetics.

Evidence from nuclear magnetic resonance (N.M.R.) studies for pi-bonding between B and N in the borazens is presented. That a similar situation might exist between P (III) and N in open chain compounds was indicated by IR studies. The energy barrier to rotation about the BN bond in dimethylaminophenylchloroborane was calculated, from observations upon three different parameters characterizing the shape of the N.M.R. signal, as 14 ± 0.8 kcal/mole. The barrier in the corresponding bromo-compound was evaluated by analogous methods. The N.M.R. spectrum of the recently reported compound, 1,3-di-t-butyl-2,4-di-t-butylamino-1,3-diaza-2,4-boretane clearly demonstrated that the compound has more than one steric configuration presumably due to exocyclic pi-bonding. (Author)

AD-426 954 Div. 4, 25, 14
OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
ELECTRICAL RESISTIVITY OF A POLYVINYL CHLORIDE-DIBUTYL PHTHALATE PLASTISOL,
by R. W. Warfield and A. H. Rosen. 23 July 63, 7p.
NOL TR63 250 Unclassified report

Descriptors: (*Vinyl plastics, Hardening), (*Plasticizers, Hardening), (*Hardening, Gels), (*Resistance (Electrical), Gels), Aging (Materials), Esters, Polyvinyl chloride, Gels, Viscosity, Electrical conductance, Transition temperature.

Electrical volume resistivity techniques have been employed to study the hardening and properties of a polyvinyl chloride-dibutyl phthalate plastisol. It is shown that resistivity measurements can be employed to follow the hardening of plastisol systems and yield information useful in elucidating the nature of the hardening process. This process appears to occur in two stages. In ordder to obtain the maximum extent of hardening, it is necessary to conduct the final stage in the hardening process at a temperature above the glass transition temperature of the polymeric component. Plasticized systems exhibit a nonlinear dependence of resistivity vs. temperature. For a number of plasticized polymers a linear relationship is found to exist between the logarithm of the magnitude of the resistivity at 25 C and the activation energy for the electrical conduction process. This relationship is discussed and a possible explanation of its significance is given. (Author)

AD-426 958 Div. 4, 10, 25
OTS price $1.60

Picatinny Arsenal, Dover, N. J.
THE HEAT OF FORMATION OF HEXAUREA ALUMINUM III PERCHLORATE,
by Charles Lenchitz and Gayton Silvestro.
June 63, 9p.
DA Proj. 1A0105013010
PA TM1295 Unclassified report

Descriptors: (*Aluminum compounds, Heat of formation), (*Perchlorates, Aluminum compounds), (*Amides, Aluminum compounds), (*Heat of formation, Aluminum compounds), Thermochemistry, Pyrolysis, Decomposition, Oxides, Bombs, Crystal structure.

Hexaurea Aluminum III perchlorate burns smoothly in a combustion bomb leaving an α Al2O3 residue. Calculation of the heat of formation from the reaction:

$$C6H24O18C13N12Al(s) + 30\frac{2}{2}(g) + 1789.5\ H2O(l) \longrightarrow$$

$$6CO2(g) + 6N2(g) + 1/2\ Al2O3(c) + 3\ (HCl.600\ H2O)$$

gives a value of -691.53 kcal/mole (at constant pressure and 25 C). (Author)

AD-426 959 Div. 4
OTS price $2.60

Stanford U., Calif.
THE REACTIONS OF METAL OXIDES WITH CR(++)aq,
by B. A. Zabin and Henry Taube. 2 Dec 63, 21p.
TR1
Contract Nonr22563, Proj. NR052 443
Unclassified report

Descriptors: (*Chromium compounds, Oxidation reduction reactions), (*Oxidation-reduction

reactions, Chromium compounds), Oxides, Manganese compounds, Lead compounds, Thallium compounds, Cobalt compounds, Cerium compounds, Perchlorates, Reaction kinetics, Catalysts, Solids, Crystal lattices, Solutions, Polymers.

When Cr(++) reacts with MnO2, PbO2, Tl2O3, Mn2O3, Co2O3, or CeO2, Cr(OH2)6(3+) is in each case the predominant form of the Cr(III) product. When the oxidizing agent has a higher ratio of O (--)/Pb(IV), as when Pb3O4 or Ca2PbO4 reacts, the Cr(III) 'dimer' (or a higher polymer) is formed. No oxygen transfer from PbO2 to Cr occurs in the oxidation reduction process, but some does occur when MnO2, Tl2O3 or Mn2O3 react. The oxides containing metal ions which undergo 2e(-) changes (MnO2, PbO2, Tl2O3) react much more rapidly than those having metal ions which undergo 1e(-) changes. When MnO2 is the oxidizing agent, and when the concentration of Cr(++) is low, a remarkable deviation from the stoichiometry described above is observed. Under these conditions ClO4(-) is reduced by Cr(++) despite the fact that the reaction of MnO2 with Cr(++). (Author)

AD-426 962 Div. 4
OTS price $2.60

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
SMALL-RING COMPOUNDS. XLI. THE FORMOLYSIS OF ALLYLCARBINYL TOSYLATE,
by Kenneth L. Servis and John D. Roberts. Dec 63, 18p. Rept. no. TR28
Contract Nonr22026, Task NR055 388
Unclassified report

Descriptors: (*Organic sulfur compounds, Solvent action), (*Aromatic compounds, Solvent action), (*Reaction kinetics, Solvent action), (*Solvent action, Reaction kinetics), Esters, Carboxylic acids, Organic solvents, Nuclear magnetic resonance, Cycloalkanes, Deuterated compounds, Ions, Alcohols.

Allylcarbinyl tosylate was found to solvolyze in 98% formic acid 3.7 times faster than n-butyl tosylate. Changes in the rate ratio with nucleophilicity of the solvent suggests different mechanisms for these solvolyses. The formolysis products of allylcarbinyl tosylate were found to be virtually identical with those from cyclobutyl tosylate. Deuterium labeling experiments indicated complete scrambling of the methylene groups in the ring-closed products. The results are interpreted in terms of formation of bicyclobutonium ion intermediates. (Author)

5. COMMUNICATIONS

AD-426 716 Div. 5
OTS price $4.60

General Electric Co., Syracuse, N. Y.
MATRIX CONTROLLED DISPLAY DEVICE.
Interim development rept. no. 2, 15 Sep-15 Dec 63.
1 Jan 64, 36p.
Contract NObsr89334, Proj. SR080301, Task 9475
Unclassified report

Descriptors: (*Display systems, Surface properties), (*Optical equipment, Display systems), Surfaces, Deformation, Thermoplastics, Oils, Optical equipment components, Optics, Optical images, Modulation, Lenses, Mirrors, Collimators, Electrodes, Resolution, Brightness, Coatings, Indium compounds, Oxides.

Progress is reported on a large screen, matrix controlled display device using in-air surface deformation recording and TIRP (Total Internal Reflection Prism) projection technique. The TIRP projection system for the optical readout of surface deformations on a thermoplastic or an oil medium was designed and implemented. Its operation is explained. Optical design considerations are given based on a 64 x 64 element display. The mechanical adjustments required for the alignment of the TIRP optical system and to provide a uniform air gap for in-air recording are discussed. The implementation of the in-air recording technique using X-Y matrix control was also completed. Circuitry to drive any desired combination of X-Y matrix electrode intersections at the display medium is described. (Author)

AD-426 818 Div. 5, 8, 24
OTS price $2.60

IIT Research Inst., Chicago, Ill.
STUDY OF FACSIMILE SCANNING AND RECORDING TECHNIQUES EMPLOYING FIBER OPTICS.
Quarterly rept. no. 3, 15 June-15 Sep 62, by D. A. Pontarelli. 16 Dec 63, 24p. Rept. no. A1203 10
Contract DA36 039SC88927, IITRI Proj. A1203
Unclassified report

Descriptors: (*Facsimile equipment, Fiber optics), (*Optical scanning, Fiber optics), (*Fiber optics, Facsimile recording systems), Resolution, Light transmission, Measurement, Equations, Spectrophotometers, Photometers.

Modification of the facsimile transmitter T-609 (XC-2)/GX from a conventional scan system to one employing fiber optics is completed. Copy produced by this instrument has a resolution in excess of 96 lines per in. An elemental scanner consisting of two illumination fibers and one pick-up fiber did not exhibit the theoretically expected decrease in resolution with an increase in the separation between the probe end and the copy. The lower than expected resolution may be due to an integration of the flux by multiple reflections between the probe and copy. The bulk transmission of a number of fiber bundles is presented. The absorption coefficients indicate a flux loss of approximately 0.5% per in. The design and theory of a photographic recording goniophotometer for determination of fiber numerical aperture is described. (Author)

AD-426 847 Div. 5
OTS price $3.60

Aerospace Information Div., Washington, D. C.
COMMUNICATIONS NETWORKS. PART II. DESIGNATIONS AND ABBREVIATIONS.
17 Dec 63, 33p.
AID P63 123
Unclassified report

Descriptors: (*Communication systems, Catalogs), (*Catalogs, Communication systems), Communication equipment, Power supplies, Telephone equipment, Telegraph equipment, Radio equipment, Multiplex, Telemeter systems.

A catalog of soviet communication networks is presented. Designations, abbreviations, and brief descriptions are given for various communication systems and associated equipments. (Author)

6. DETECTION

AD-426 678 Div. 6
OTS price $1.60

Naval Research Lab., Washington, D. C.
A RADAR RANGE-HEIGHT CHART REPRESENTING REFRACTED

RAYS AS STRAIGHT LINES,
by F. D. Clarke and L. V. Blake. Dec 58, 5p.
Proj. NR412001
NRL MR879 Unclassified report

Descriptors: (*Radar signals, Atmospheric refraction), Refraction, Refractive index, Errors, Propagation, Calibration, Height finding, Range finding, Ranges (Distance), Radio waves, Maps, Microwaves.

A radar range-height chart has been devised using figures recently computed by Lincoln Laboratory for refraction in a cool-weather atmosphere. These figures differ from the heretofore commonly accepted 4/3-earth-curvature assumption, which was seriously in error at long ranges. This chart has been so designed that ray paths of all elevation angles are presented as straight lines, although the actual rays curve in a manner which varies with height. This is accomplished at the expense of a non-linear height scale. The chart covers the range interval 0-350 miles and the height interval 0-100,000 feet. (Author)

AD-426 737 Div. 6
OTS price $1.10

Melpar, Inc., Falls Church, Va.
DESIGN STUDY AND DEVELOPMENT OF A PERSONNEL-VEHICULAR DISCRIMINATOR.
Monthly letter progress rept. no. 13.
11 Dec 63, 10p.
Contract DA36 034ORD3713
Unclassified report

Descriptors: (*Detection, Target discrimination), (*Vehicles, Detection), (*Personnel, Detection), Environmental tests, Sensitivity, Tables, Armored vehicles, Tests, Detectors.

Efforts were continued on the development of a personnel-vehicular discriminator. Environmental tests and field tests were conducted. The results are presented in tabular form.

AD-426 759 Div. 6, 8, 25, 26
OTS price $2.60

Sylvania Electric Products, Inc., Mountain View, Calif.
OPTIMIZED COHERENT OPTICAL RECEIVER TECHNIQUES.
Dec 63, 22p.
Contract AF30 602 3162, Proj. 45 06, Task 450608
RADC TDR63 490 Unclassified report

Descriptors: (*Photoelectric cells (Semiconductor), Detectors), (*Detectors, Images), (*Lasers, Detection), Optical equipment, Electron guns, Microwave frequency, Modulation, Scanning, Magnetic fields, Deflection, Photoelectric materials, Traveling wave tubes, Electrostatic fields, Manufacturing methods, Phototubes, Sensitivity, Silver, Metal films.

Presented is an applied research program to develop a scannable photosensitive image detector capable of responding to modulation at a microwave rate. The initial tube design has been completed, utilizing an image dissector electron gun, together with an X-band slow-wave structure. The first phase of the program, which was the construction of test diodes to evaluate the cathode surface, has been completed. Work on the second phase, which will be the evaluation of the deflection system using a complete gun tester, but without a slow-wave structure, has begun. One gun tester has been completed, and the deflection system is finished except for the sweep amplifiers. (Author)

AD-426 778 Div. 6
OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
IMPROVED BLACK RADIATION DETECTOR,
by R. L. Bates and W. L. Eisenman. 15 Dec 63, 12p.
NOLC rept. 594; Photodetector Series, 60
Unclassified report

Descriptors: (*Infrared detectors, Design), Sensitivity, Calibration, Thermocouples, Blackbody radiation, Thermistors, Bolometers.

A black radiation detector has been developed for use as a standard against which infrared detectors can be evaluated. Constructed in the form of a cone with its interior coated with black Sicon, this improved detector is believed to have an effective absorptance of 0.995 or more out to 45 microns. Measurements of the spectral characteristics of three radiation thermocouple detectors, two thermistor bolometers, and a Golay pneumatic detector are compared with that of the conical detector, over the spectral range of 1 to 40 microns. (Author)

AD-426 799 Div. 6, 8, 12, 30
OTS price $8.10

Wolf Research and Development Corp., West Concord, Mass.
CALIBRATION SATELLITE SYSTEM STUDY.
Final rept.
6 Nov 63, 1v. Rept. no. 63 3258 8
Contract AF19 628 3258, Proj. 5930, Task 5930 03
AFCRL 63 920 Unclassified report

Descriptors: (*Guided missile ranges, Calibration), (*Satellites (Artificial), Calibration), Operations research, Radar tracking, Ground support equipment, Costs, Digital computers, Orbital trajectories, Mathematical analysis, Least squares method, Errors, Transponders, Radar beacons, Range finding, Radar stations, Mathematical prediction, Research program administration, Perturbation theory.

This report summarizes the results of a study program conducted on the primary features of a calibration satellite system for the calibration of the AMR tracking instrumentation. It considers the general requirements for the satellite, booster, tracking stations, ground station equipment, as well as all operational requirements including digital computer programs and data links necessary to effect a calibration. The major study areas covered include planning studies, calibration ground system studies, orbit and trajectory studies and satellite equipment studies. Recommendations for future efforts are also provided. (Author)

AD-426 913 Div. 6
OTS price $3.60

Army Missile Command Redstone Arsenal, Huntsville, Ala.
AN ANALYTICAL DETERMINATION OF THE RADAR CROSS SECTION OF CERTAIN MISSILE-LIKE CONFIGURATIONS.
by Robert J. Chynoweth and Robert R. Boothe.
13 Aug 63, 34p.
Proj. 1B2 22901A204
AMC RA FR TR 63 16 Unclassifified report

Descriptors: (*Aerodynamic configurations, Radar echo areas), (Radar echo areas, Geometric forms), (*Guided missiles, Configuration) Mathematical analysis.

The assumptions, methods, and equations used by the Advanced Systems Laboratory, USAMICOM, in the

analytical determination of the radar cross section of various missile configurations are discussed. The method used is primarily that of physical optics. Examples, using the physical optics integral, are included. Two methods of computing the cross section are given: (1) phase addition --giving a complex pattern and, (2) random addition--giving an effective pattern. (Author)

AD-426 915 Div. 6, 8
OTS price $6.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
INVESTIGATIONS OF ADAPTIVE DETECTION TECHNIQUES.
Annual rept. Aug 62-Aug 63,
by J. G. Lawton and C. J. Henrich. Nov 63, 71p.
Rept. no. RM1744 S 1
Contract Nonr392700, Task 187 400
Unclassified report

Descriptors: (*Pulse analyzers, Adaptive control systems), (*Wave analyzers, Adaptive control systems), Demodulation, Signals, Matched filters, Signal-to-noise ratios, Video signals, Narrow band, Mathematical analysis, Analog computers, Simulation, Digital computers, Detection, Theory.

This interim report, which describes an investigation of adaptive detection techniques, is organized into two fairly independent sections. Chapter II describes the situations under which use of an adaptive detection system may be desirable, the general characteristics of such systems and some results obtained by analog simulation of one system which has shown that the detection performance of the system improves as the system converges to a matched filter, as predicted by theory. Chapter III presents a detailed analysis of a one-dimensional nonparametric system. By making simplifying assumptions, recursion formulas for the first and second moments of the signal values are obtained for the case when the noise is gaussian conditions under which these moments tend to certain limits (convergence) are obtained, and the limits, which turn out to be biased, are evaluated. Means for removing the bias are described. Experimental results, obtained by means of a digital computer, are found to agree fairly well with the approximate theory. (Author)

AD-426 979 Div. 6, 2
OTS price $1.60

Woods Hole Oceanographic Institution, Mass.
SONAR RESEARCH.
Quarterly progress rept., 1 July-30 Sep 62.
Mar 63, 14p. Ref. no. 63 8
Contract NObsr72521
Unclassified report

Descriptors: (*Sonar, Research program administration), Acoustic properties, Acoustics, Sea water, Underwater sound, Underwater sound signals, Sonar targets, Submarines, Noise, Reports, Seismic waves, Sound transmission, Scattering, Refraction, Reflection, Geophysics, Underwater sound equipment, Echo ranging, Modulators, Antisubmarine warfare.

During this period the research at sea consisted of echo strength measurements aboard BEAR. These tests were made in neighboring waters and were of short duration. Methods of analyzing these measurements were developed with the new data acquisition and data processing equipment. Seismic research under this contract is in its final stage as the refraction data from the western Mediterranean is being completed. Sound transmission and scattering data previously recorded were included in a repetitive analysis program for the summer period. (Author)

AD-426 980 Div. 6
OTS price $1.60

Woods Hole Oceanographic, Institution, Mass.
SONAR RESEARCH.
Quarterly progress rept., 1 Apr-30 June 63.
Sep 63, 10p. Ref. no. 63 32
Contract NObsr72521
Unclassified report

Descriptors: (*Sonar, Research program administration), Echo ranging, Underwater sound, Computers, Programming (Computers), Scientific personnel, Instrumentation, Oceanology, Ocean bottom sampling, Noise, Ocean bottom, Operations research, Cetacea, Sound transmission, Spectrum analyzers.

During the period April through June 1963 the research program supported under Contract NObsr-89464 continued to consist wholly of analysis of data and preparation of scientific papers at Woods Hole, except for contributions which virtually all members of the Geophysics Department made to the THRESHER search. Research results of this quarter have been the high degree of correlation between sediment types and bottom reflectivity and the identification of long obscure relations between sounds often recorded in the deep sea and various species of cetaceans. (Author)

7. ELECTRICAL EQUIPMENT

AD-426 504 Div. 7
OTS price $8.60

Institute for Defense Analyses, Washington, D. C.
SPACE POWER SYSTEMS: 1963 STATE OF THE ART,
by G. C. Szego. 1 Sep 63, 1v.
Unclassified report

Paper presented at the XIVth Congress of the International Astronautical Federation, Sep 63, Paris.

Descriptors: (*Power supplies, Spacecraft), (*Reviews, Power supplies), Solar cells, Energy conversion, Nuclear power plants, Radioactive isotopes, Thermoelectricity, Thermionic converters, Magnetohydrodynamics, Batteries & components, Fuel cells, Reports, Bibliographies, Space environmental conditions.

Contents: Photovoltaic Conversion and Environmental Behavior of Solar Cells; Solar Concentrator Technology; Space Nuclear Fission Power Systems; Dynamic Machinery Systems for Space Power; Radioisotope Space Power; Thermoelectricity for Space Power Applications State-Of-The-Art; Thermionic Energy Conversion; Magnetohydrodynamic Power Generation; Batteries and Fuel Cells for Space; and Power Conditioning for Space Vehicles.

AD-426 687 Div. 7, 14
OTS price $3.60

General Instrument Corp., Newark, N. J.
SOLAR FLAT PLATE THERMOELECTRIC GENERATOR RESEARCH.
Quarterly rept. no. 3, 1 Sep-1 Dec 63.
15 Dec 63, 27p.
Contract AF33 657 10335, Proj. 8173, Task 817302
Unclassified report

Descriptors: (*Auxiliary power plants, Generators), (*Power supplies, Generators), (*Generators, Thermoelectricity), Structures, Solar radiation, Optical coatings, Radiators, Soldering alloys, Supports, Bonding, Structural properties, Storage, Feasibility studies, Vibration, Tests, Panels (Structural), Metal plates, Foils, Aluminum.

A solar flat plate thermoelectric generator consists of a collector plate with an optically selective coating, small size semiconductor thermoelements, a radiator plate and a support structure. This report describes the research and development work performed during the third three-month period of this program. Panels 4 in. x 4 in. in size, passed specified sinusoidal vibration testing. These panels were based on a support structure concept designated as the ''integral reinforced plate,'' in which radiator and collector plates have their edges bent to provide structural reinforcement, thus providing self-supporting structures. A number of thermal cycling tests were conducted up to a maximum of 6000 cycles. Several of the panels tested had no observable resistance changes. Other panels had changes of no more than 6%. A test of a flat plate panel using thermal storage was conducted. (Author)

AD-426 691 Div. 7, 17
OTS price $1.60

Melpar Inc., Falls Church, Va.
2000 F POWER WIRE FOR AEROSPACE ENVIRONMENT.
Quarterly rept. no. 3, 5 Oct 63-5 Jan 64,
by M. L. Gimpl and E. E. Childs. 5 Jan 64, 12p.
Contract AF33 657 11046, Proj. 8128, Task 812806
Unclassified report

Descriptors: (*Rhodium, Electric wire), (*Platinum, Pipes), (*Nickel alloys, Wire), Seals (Stoppers), Aluminum compounds, Oxides, Thermal expansion, Brazing, Electrical properties, Electric insulation, Magnesium compounds, High temperature research, Space environmental conditions, Thorium compounds, Stresses, Tensile properties, Expansion joints, Environmental tests.

The 22-gauge power-wire systems were found to have defective alumina end seals. The expansion joints in the end-seal design were found to be filled with braze material. This caused cracking of the end seal when the system was heated because of the large difference in coefficients of expansion of rhodium and alumina. A new end-seal design has been made which places the alumina in compression. Twelve-gauge DU Pont TD (thoria-dispersed) nickel had resistivities of 7.84 and 44.36 microhm-cm at 77 and 1400 F respectively. (Author)

AD-426 733 Div. 7, 25
OTS price $8.10

IIT Research Inst., Chicago, Ill.
STUDY OF COMPREHENSIVE FAILURE MECHANISM THEORY.
Final rept. 26 Feb 62-26 May 63,
by M. E. Goldberg, A. Horbert, D. W. Levinson, and R. G. Stewart. Aug 63, 1v.
Contract AF30 602 2731, Proj. 5519, Task 551902
RADC TDR63 431 Unclassified report

Descriptors: (*Resistors, Metal films), (*Failure (Mechanics), Theory), Resistance (Electrical), Thermal stresses, Time, Nickel alloys, Chromium alloys, Aluminum alloys, Copper alloys, Statistical analysis, Mathematical models, Programming computers, Programming languages, Oxidation, Reliability (Electronics).

Behavior of deposited film resistors has been studied. Results to date indicate oxidation and precipitation of the resistive film to be the principal mechanisms responsible for changes in resistance under temperature stress and with time. Mathematical models for resistor behavior based upon oxidation processes and other mechanisms have been programmed for the IBM 7090 computer. A technique is described for extending these essentially deterministic models into their probabilistic counterparts. The most likely sources of variation which would give rise to variations in times to failure are discussed. (Author)

AD-426 771 Div. 7
OTS price $1.10

Sylvania Electric Products, Inc., Waltham, Mass.
POWER SUPPLIES CORRECTIVE ACTION PLAN NO. 2. REGULATOR POTENTIOMETERS.
Dec 63, 8p.
Unclassified report

Descriptors: (*Potentiometers, Current regulators), (*Current regulators, Resistors), (*Resistors, Current regulators), Power supplies, Production, Design, Electrical equipment.

Since the objection to the use of adjustable resistors seems to be based primarily on reliability considerations, several methods of adjusting and trimming the output voltages of the various regulators were studied to determine if there would be a significant reliability advantage in replacing the variable resistors with fixed resistor networks. The results of these studies indicated that use of adjustable resistors, apart from being the most convenient method for making initial regulator adjustments, has sufficient other advantages to make it the most desirable method. Therefore, the recommended solution to this problem is the continued use of adjustable resistors for the purpose of making initial voltage adjustments at the time of manufacture, and further adjustments or corrections when the unit is undergoing maintenance or repair at a depot. (Author)

AD-426 776 Div. 7, 9, 25
OTS price $12.50

Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
SUPERCONDUCTING MAGNET RESEARCH AND APPLICATION TO MHD POWER GENERATORS.
Final rept., 1 Feb-31 Oct 63,
by R. R. Akers, W. A. Stewart, T. C. Tsu, R. E. Kothman and O. T. Beecher. 31 Dec 63, 369p.
Contract AF33 657 10567, Proj. 8173, Task 817306
RTD TDR63 4170 Unclassified report

Descriptors: (*Electromagnets, Superconductors), (*Magnetohydrodynamics, Generators), Superconductivity, Power reactors, Auxiliary power plants, Cryogenics, Zinc, Magnetic fields, Refrigeration systems, Hall effect, Helium, Refrigerants.

A theoretical study of the application of large superconducting magnets to MHD generators used for space power generation is presented. The study determines the need for superconducting magnets in lieu of conventional magnets for this application. A suitable superconducting magnet-MHD generator system is developed which includes the solution of the following problems: winding configuration, field strength and field variations, stress and magnetic force support structures, heat rejection radiators, cryogenic and high temperature cooling, stored helium cooling,

refrigeration and insulation, superconductor properties, magnet protection, and losses in the MHD process due to field strength and field variations. Optimum techniques and parameters are investigated for all components. This subsystem is then combined with state-of-the-art estimates of specific weights for developed turbine generator systems. These estimates give a final plant specific weight for a one megawatt electrical generator, operating on a Rankine cycle and utilizing zinc as the working fluid. This system is then optimized with respect to magnetic field strength and field homogeniety. (Author)

AD-426 791 Div. 7
OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
LITHIUM ANODE LIMITED CYCLE SECONDARY BATTERY.
Quarterly technical progress rept. no. 2,
by H. F. Bauman. 15 Dec 63, 26p.
Contract AF33 657 11709, Proj. 8173, Task 817304
Unclassified report

Descriptors: (*Storage batteries, Materials), (*Lithium, Anodes (Electrolytic cells)), (*Electrodes, Storage batteries), (*Electrolytes, Storage batteries), Electrolytic cells, Wet cells, Copper compounds, Cobalt compounds, Fluorides, Phosphates, Sodium compounds, Esters, Alkenes, Complex compounds, Carbonates, Ketones, O-heterocyclic compounds, Battery separators, Electrical conductance, Polarization, Compatibility, Corrosion resistant alloys, Polyester plastics, Polyethylene plastics.

Solutions of NaPF6 in propylene carbonate or butyrolactone have conductivities sufficiently high to make them useful in cells. Stainless steels and aluminum resist corrosion in these solutions. Polyolefin and polyester nonwoven fabrics may be used as separators. Li anodes in propylene carbonate - NaPF6 show polarization increases of less than 200 millivolts during a 100 hour discharge at 10 ma/in to the 2nd. power and utilization of over 85% of active material. CuF2 electrodes may be discharged at 1 ma/in to the 2nd. power and utilization of 30% obtained with approximately 1.5 volts polarization. Electrode test results were used to design, construct and test cells with Li anodes and CuF2 cathodes. (Author)

AD-426 882 Div. 7, 30, 20
OTS price $9.10

General Atomic Div., General Dynamics Corp.,
San Diego, Calif.
HIGH-TEMPERATURE VAPOR-FILLED THERMIONIC CONVERTER.
Final technical rept., 15 Mar 62-15 Sep 63,
by R. Skoff. 3 Jan 64, 97p. Rept. no. GA4012
Contract AF33 657 8563, Proj. 8173, Task 817305 5
RTD TDR63 4190 Unclassified report

Descriptors: (*Thermionic converters, Performance (Engineering)), (*Plasma sheath, Simulation), Uranium compounds, Zirconium compounds, Carbides, Thermionic emission, Cesium, Life expectancy, High-temperature research, Reactor control, Reactor fuels, Tantalum, Electric power production, Performance (Engineering), Thermocouples, Fission products, Vaporization, Diffraction analysis, Visual inspection, Gas leaks.

The operating characteristics of plasma converters utilizing bare uranium-zirconium carbide as the emitting surface were determined as a function of operational lifetime. The emitter design was cylindrical in a size representative of that expected in a space thermionic reactor. The electrode spacing varied from 0.040 in. early in the program to 0.012 in. An operational lifetime of 3000 hr was considered a reasonable goal. Electrically heated, as opposed to fission-heated, converters were selected as the most economical method of fulfilling these objectives. Six converters were operated for over 6000 hr at power levels of 10 to 40 w (1 to 4 w/sq cm) on a continuous-performance basis. A maximum power density of 6.8 w/sq cm was observed at an emitter temperature of 2245 K. The optimum Ce-reservoir temperature for all converters tested occurred at 605 to 630 K. Five of the 6 converters failed during operation owing to envelope leakage, resulting in the complete loss of cesium to the surrounding vacuum chamber. Despite the depletion of uranium from the bulk of the emitter, vacuum-emission currents measured pre- and post-test were nearly identical in magnitude. (Author)

AD-426 937 Div. 7, 16, 4
OTS price $4.60

Research and Development Labs., Magna Corp.,
Anaheim, Calif.
BIOCHEMICAL FUEL CELLS.
Quarterly progress rept. no. 5, 1 July-30 Sep 63,
by J. M. Brake, W. R. Momyer and H. P. Silverman.
30 Sep 63, 1v.
Contract DA36 039sc90866, Task 1G6 22 001A053 04 01
Unclassified report

Report on The Development of Electrochemical Power Generators Using Biochemical Reactions.

Descriptors: (*Power supplies, Fuel cells), (*Fuel cells, Biochemistry), (*Microorganisms, Fuel cells), Escherichia, Electrochemistry, Carboxylic acids, Glucose, Hydrogen, Culture Media, Electrodes, Electric currents, Electric potential, Feasibility studies, Oxidation.

The electro-oxidation of hydrogen and formic acid, two products of potentially useful biological reactions, were investigated under conditions compatible with, but independent of, biological systems. The best performance, to date, of any biological fuel tested was obtained with formic acid. This electrode supported 10 mA/sq cm at a polarization of 260 mV under conditions compatible with E. coli. Improved and consistent growth of Cl. butyricum were obtained with AC broth supplemented with thioglycollate. Hydrogen production as a function of growth, as well as the best time to harvest cells for optimum hydrogen production, were also determined for this organism. The electrochemical behavior of the E. coli-glucose and the Cl. butyricum-glucose systems, two potentially useful bioelectrodes, were investigated using dispersed suspensions of the bacteria. The limiting current density and the rate of hydrogen production were determined for both of these systems as a function of bacterial concentration. (Author)

AD-426 951 Div. 7
OTS price $3.60

Gulton Industries Inc., Metuchen, N. J.
INVESTIGATION OF METHODS LEADING TO THE DETERMINATION OF THE STATE OF CHARGE OF NICKEL-CADMIUM BATTERIES.
Quarterly progress rept., no. 3, 1 July-30 Sep 63,
by J. Wartell and H. N. Seiger. Sep 63, 30p.
Contract DA36 039AMC00109E, Proj. 1G6 22001A053 02
Unclassified report

Descriptors: (*Storage batteries, Circuits),

(*Capacitance, Storage batteries), (*Circuits, Storage batteries), Nickel, Cadmium, Electric discharges, Electrical properties, Electrolytic cells.

Using an improved bridge circuit, the equivalent circuit components of a nickel-cadmium cell were measured at frequencies of 10, 20, and 200 cps at various states of charge. The measurements were made on a group of vented cells. It was found that the equivalent circuit components, especially R sub c at 10 and 20 cps changed with time. A correlation of R sub c with residual capacity was found after cells were stored for more than four hours after discharge. (Author)

AD-426 952 Div. 7, 4
OTS price $2.60

Harry Diamond Labs., Washington, D. C.
FLOW-THROUGH POROUS ELECTRODES FOR REDOX COUPLES,
by David Singman and A. P. Bond. 4 Oct 63, 34p.
HDL Proj. 96000

Unclassified report

Descriptors: (*Fuel cells, Electrodes), (*Electrodes, Porosity), (*Polarization, Fuel cells), Porous materials, Carbon, Platinum, Tantalum, Titanium, Bromine, Titanium compounds, Oxides, Ions, Catalysts, Iridium, Electric potential, Ions, Oxidation-reduction reactions, Anodes, Cathodes, Electrochemistry, Electrolytic cells.

Investigation of the electrochemical behavior of the Ti(+++) - TiO(++) and Br2 - Br(-) couples was continued with polarization measurements at porous flow-through electrodes. Porous carbon was found to be an effective electrode material. Carbons with an average pore diameter of 0.001 to 0.002 in. were superior in performance to those with larger pores. Incorporation of a small amount of platinum or iridium metal in the porous carbon resulted in a marked decrease in electrode polarization. Samples of porous tantalum and titanium were considerably inferior to carbon in electrode behavior, while porous platinum gave excellent results. Complete cells were constructed and evaluated with results very close to those expected on the basis of single-electrode measurements. (Author)

AD-426 960 Div. 7, 14
OTS price $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
RESEARCH ON CESIUM-VAPOR CELLS EMPLOYING CARBIDE EMITTERS.
Final technical rept., 1 May 60-31 Oct 63,
by F. D. Carpenter, G. T. Cheney and B. Rump.
27 Dec 63, 35p. GA4677
Contract Nonr319300

Unclassified report

Descriptors: (*Thermionic converters, Cesium), (*Thermionic emission, Tungsten), (*Cesium, Thermionic converters), (*Carbides, Thermionic emission), (*Electric power production, Thermionic converters), Energy conversion, Uranium compounds, Zirconium compounds, Vapors, Adsorption, Work functions, High-temperature research, Electric currents, Electric potential.

Measurements were performed on experimental thermionic cesium cells as direct converters of heat to electricity. Results indicate that cesium is adsorbed on the surfaces of carbide emitters and that useful power is produced in a cell which contains a carbide emitter and carbide collector. Operational characteristics of identical thermionic cells which contained a tungsten emitter and carbide emitter are illustrated. (Author)

AD-426 966 Div. 7, 14, 25
OTS price $1.60

Laboratories for Research and Development
Franklin Inst., Philadelphia, Pa.
CATALYTIC COMBUSTION HEAT SOURCES FOR THERMAL ENERGY CONVERTERS.
Quarterly progress rept. no. 2, 1 July-30 Sep 63,
by Mullapudi M. Reddi and Robert A. Baker.
1 Aug 62, 11p. Rept. no. Q B2088 2
Contract DA36 039AMC02177E

Unclassified report

Descriptors: (*Combustion, Catalysts), (*Generators, Thermoelectricity), (*Heaters, Catalysts), (*Catalysts, Heaters), Energy conversion, Gasoline, Vanadium compounds, Oxides, Gels, Aluminum compounds, Heat transfer.

Investigations leading to the ddevelopment of a catalytic burner using leaded gasoline as a fuel for use with thermoelectric generators are reported. Experimental results on two vanadia catalysts are given for extended testing. During 200 hours of operation, overall oxidation efficiencies of 85 to 90% were obtained at space velocities of 24,000 hr to the -1 power and 20,500 hr to the -1 power. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-426 501 Div. 8
OTS price $18.50

Dunlap and Associates, Inc., Santa Monica, Calif.
A RELIABILITY-MAINTAINABILITY TRADE-OFF PROCEDURE FOR NAVY ELECTRONIC EQUIPMENT,
by Ronald A. Westland and Donald T. Hanifan.
June 63, 1v.
Contract NObsr87584
Unclassified report

Descriptors: (*Electronic equipment, Reliability), (*Reliability, Management engineering), Naval equipment, Maintainability, Costs, Effectiveness, Design, Naval personnel, Shipborne, Maintenance, Logistics, Analysis, Transistors, Electron tubes, Failure (Mechanics), Resistors, Capacitors, Electric connectors, Diodes (Semiconductor).

The development of a reliability-maintainability trade-off procedure for electronic systems and equipment is presented. The procedure constitutes an analytical design tool for systematically generating and evaluating design approaches for reliability and maintainability, and for selecting a design which: (1) satisfies a specified availability goal (or an alternative goal such as dependability); (2) satisfies design and mission related constraints; and (3) results in design optimization with respect to a trade-off criterion such as minimum cost. The procedure is oriented to the task of assisting design initiation as opposed to design review in accordance with the requirement to make major design decisions during the planning stage or in the early phases of the design and development cycle. The concept of a ''standard design'' or starting point design assumption, and a well defined method of considering alternative design approaches facilitate the use of the procedure as a design initiation tool. Although the procedure can be applied in its present form, its use will be greatly simplified by the development of improved restore time and failure rate prediction techniques, the collection of a body of standard design and support data, and refinement of the procedure itself though application. (Author)

AD-426 513 Div. 8
OTS price $3.60

General Electric Co., Syracuse, N. Y.
VIDICON TRACKER DEVELOPMENT.
Interim engineering rept., 1 June-30 Nov 63.
30 Nov 63, 27p.
Contract AF33 657 11652, Proj. 4200
Unclassified report

Descriptors: (*Camera tubes, Electron optics), Electric fields, Magnetic fields, Electrostatics, Cathodes (Electron tubes), Electron beams, Photoconductivity, Electron guns, Thermionic emission.

A Vidicon tube with magnetic focus and electrostatic deflection is described. The tube uses a new type of crossed-field system, which employs a Deflectron cylinder immersed in a magnetic field. A Pierce cathode with 0.5-mil aperture is used. A sample tube in a 5 in. x 1 in. envelope yields a signal current of 0.48 microampere at 900 volts. It scans a 5/8 in. target with 70 volts of sweep and shows better than 2000 lines per inch, or 800 TV lines, with good center-to-edge resolution. (Author)

AD-426 530 Div. 8, 26
OTS price $3.60

Photocircuits Corp., Glen Cove, N. Y.
PRODUCTION ENGINEERING MEASURE FOR MULTILAYER PRINTED WIRING BOARD.
Quarterly rept. no. 2, 1 Oct-31 Dec 62,
by G. Messner, R. McCaw and M. Paluszek.
31 Dec 62, 34p.
Contract DA36 039sc86745
Unclassified report

Descriptors: (*Printed circuits, Manufacturing methods), Processing, Industrial production, Effectiveness, Tests, Glass textiles, Epoxy plastics, Laminated plastics, Sandwich construction, Foils, Copper, Subminiature electronic equipment.

Efforts were continued on the establishment of a production engineering measure for multilayer printed wiring boards. A further evaluation of the selected sequence of manufacturing steps was conducted. Two new process sequences were introduced to improve the efficiency of the entire process. The required number of engineering samples were manufactured and one group is undergoing tests. Testing of samples of epoxy fibreglass thin base laminates was completed and a specification for thin base laminates prepared. (Author)

AD-426 577 Div. 8, 15
OTS price $2.60

Norwegian Defence Research Establishment.
SUBHARMONIC OSCILLATIONS IN PARAMETRIC DIODES,
by K. A. Ingebrigtsen. 16 Apr 63, 29p.
Contract AF61 052 484
AFCRL 63 570; NDRE TN7 Unclassified report

Descriptors: (*Harmonic oscillators, Nonlinear systems), (*Varactor diodes, Harmonic oscillators), (*Non-linear systems, Mathematical analysis), Differential equations, Frequency, Capacitance, Mathematical prediction, Diodes (Semiconductor).

Investigation of subharmonic oscillations of order one-half and one-third in presence of a capacitor with a nonlinear charge-voltage relationship of third order is made. It is found that for one-half oscillations the nonlinearity of second order is essential for the existence of the subharmonic while the nonlinearity of third order results in a definite amplitude on the oscillation as a function of frequency. For subharmonics of order one-third the third order nonlinearity is essential for existence while the second order nonlinearity does not contribute to the solution in the first approximation. For both cases the particular nonlinearity of a parametric diode is inserted and discussed. Further limitation due to the conduction properties of a diode is also considered. (Author)

AD-426 584 Div. 8, 14, 26
OTS price $1.60

Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200 C.
Quarterly rept. no. 10 for period ending 27 Oct 63,
by Paul C. Ricard. 27 Oct 63, 10p.
Contract DA36 039sc85955
Unclassified report

Descriptors: (*Capacitors, Fluorination), (*Ceramic capacitors, Fluorination), Encapsulation, Silicon compounds, Environmental tests, Performance (Engineering), Electrical properties, Tensile properties, Construction, Barium compounds, Design, Zirconates, Titanates, Tables, Life expectancy, Production, Manufacturing methods, Silicone plastics, Silicates.

Capacitor construction, utilizing a high temperature solder and tinned copper leads, has given increased lead strength over previous construction techniques. A new encapsulant, embodying a system of silicone resins and zirconium silicate filler, has been developed, which fulfills the lead strength requirement and which has passed all environmental tests as set forth in SCS37. This newly developed encapsulant can withstand a five pound pull test on the CK63 style. (Author)

AD-426 690 Div. 8, 26
OTS price $8.10

Pacific Semiconductors Inc., Lawndale, Calif.
UTILIZATION OF NEW TECHNIQUES AND DEVICES IN INTEGRATED CIRCUITS.
Quarterly rept. no. 2, 1 Aug-31 Oct 63.
31 Oct 63, 83p.
Contract AF33 657 11185
Unclassified report

Descriptors: (*Integrated circuits, Transistor amplifiers), (*Transistor amplifiers, Integrated circuits), Linear systems, Bandwidth, Specifications, Production, Switching circuits, Diodes (Semiconductor), Transistors, Electric current, Electric potential, Gain, Performance (Engineering), Frequency, Photoengraving, Silicon, Epitaxial growth.

Fabrication and evaluation of the differential portion of the Read amplifier were carried out and the results are satisfactory. Designs of the final portions of the Read amplifier were completed and performance checked using breadboard techniques. The Write amplifier design was also completed and checked by breadboarding. Integrated circuit pattern layout and photo-reduction are in progress. Six Write amplifiers are included in a single chip. Advances in processing techniques were made in the areas of reduced lateral dimensions, insulated gate field effect transistor, and integrated circuit pnp bipolar transistor fabrication. Processing studies were conducted on ways to increase the f sub t frequency of the integrated circuit npn transistor. The advances in processing technology, together with circuit evaluation of the breadboard models and the integrated differential amplifier, have produced increasing confidence in the development of high-performance integrated circuit linear amplifiers. (Author)

AD-426 692 Div. 8, 30
OTS price $1.60

Westinghouse Electric Corp., Elmira, N. Y.
APPLICATION OF LIGHT AND IMAGE INTENSIFICATION.
Monthly technical engineering rept. no. 5, 1-30 Nov 63,
by Z. Szepesi and W. A. Thornton. 13 Dec 63, 16p.
Contract N613391440
Unclassified report

Descriptors: (*Image intensifiers (Electronics), Semiconductor devices), (*Semiconductor devices, Image intensifiers (Electronics)), Programming (Computers), Programming languages, Life expectancy, Equations, Semiconducting films, Brightness, Gain, Electroluminescence, Digital computers.

Generalized equations were derived for the PC-EL basic image intensifier circuit. A program was written in FORTRAN language using these general formulas for calculating image intensifier characteristics. Dark currents and nonlinearities of the PC element and power factor of the EL element were considered. Curves are presented which were drawn from the data obtained from the computer study. Experiments were started for decreasing the trap density of the PC material, hoping to improve the speed. In the evaporated EL film work most effort has been stressed to improve film uniformity in larger areas. Life test measurements were started. (Author)

AD-426 727 Div. 8
OTS price $1.10

Melpar Inc., Falls Church, Va.
DESIGN AND DEVELOPMENT OF A PERSONNL-VEHICULAR DISCRIMINATOR.
Monthly letter Progress rept.
10 Oct 63, 5p.
Contract DA36 340RD3713
Unclassified report

Descriptors: (*Detection, Vehicles), (*Vehicle, Personnel), (*Personnel, Detection), Test methods, Amplifiers, Gain, Sensitivity, Temperature.

AD-426 729 Div. 8
OTS price $11.50

SFD Labs. Inc., Union, N. J.
RESEARCH AND DEVELOPMENT ON L-BAND CROSSED-FIELD AMPLIFIER CHAIN.
Semi-annual rept., Sep-Feb 63,
by M. Mangot and H. L. McDowell. Nov 63, 143p.
Contract AF30 602 2533, Proj. 4983; ARPA Order 136 61, Task 55287
RADC TDR63 492 Unclassified report

Descriptors: (*Microwave amplifiers, L band), (*Electron tubes, Microwave amplifiers), Electromagnetic fields, Magnetic fields, Magnets, Ferrites, Attenuators, Feedback, Phase measurement, Packaged circuit, Theory, Garnet, Test equipment (Electronics), Radio-frequency pulses, Electric fields, Electron tube parts, Measurements, Mathematical analysis, Electric potential, Electrodes, Phase shifters, Phase studies.

New versions of both driver and power tubes were designed, and construction of these tubes was started. Studies were made of different magnetic circuit designs to determine how tubes could best be mounted in a phased array. It was concluded that a fixed array of permanent magnets with removable tubes made largely of non-magnetic material is preferable to combined tube and permanent magnet packages. Initial tests were made on the incorporation of a non-reciprocal ferrite attenuator on the slow wave circuit. While these tests show promise, they also indicate that a number of difficult problems must be solved to obtain a satisfactory non-reciprocal attenuator. Procurement of phase measuring equipment and life test equipment was started. A study of the relative costs of one antenna element per tube versus several elements per tube was conducted with the tentative conclusion that several elements per tube would be cheaper if the necessary high power phase shifters could be made available at reasonable cost. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-426 751 Div. 8, 26
OTS price $3.60

RCA Defense Electronic Products, Camden, N. J.
MICRO-MODULE PRODUCTION PROGRAM.
Quarterly rept. no. 22, 1 July-30 Sep 63.
30 Sep 63, 1v.
Contract DA36 039sc75968
Unclassified report

Descriptors: (*Microminiaturization (Electronics), Production), Capacitors, Resistors, Coils, Transistors, Diodes (Semiconductor), Packaged circuits, Quartz resonators, Scheduling, Semiconductors.

Contents: Program extension II PEM; Micro-modules; Micropac computer; The micro-module (MM) concept -- Industry participation; Passive parts; Semiconductor devices - production engineering measure (PEM); Crystals - production engineering measure (PEM); Micro-modules for program extension II, equipment phase; Micro-module preproduction, PEM phase; Pilot-line production micro-modules; Automatic notch metalizer; AN/PRC-51 radio set.

AD-426 758 Div. 8, 5
OTS price $13.50

Tridea Electronics, Inc., South Pasadena, Calif.
A STUDY AND INVESTIGATION OF THE OPERATIONS CENTRAL AN/MSQ-16(XW-2).
Final rept.
Dec 63, 183p.
Contract AF30 602 3095, Proj. 4557
RADC TDR63 403 Unclassified report

Descriptors: (*Test sets, Communication equipment), (*Communication equipment, Airborne), Antennas, Radio receivers, Performance (Engineering), Tracking, Scanning, Data processing systems, Antenna radiation patterns, Radio-frequency spectroscopy, Gain, Bandwidth, Antenna configurations, Flight paths, Real time.

Presented are the detailed requirements of the Operations Central AN/MSQ-16 (XW-2) equipment to be installed at the Verona Test Site at the Rome Air Development Center, for the purposes of making in-flight antenna pattern measurements and to provide a general purpose facility to make spectrum signature measurements on a wide variety of radiating weapon systems. The various expected signal sources are analyzed and the required equipment performance in terms of antenna gains and receiver sensitivities is specified. An analysis of means of providing a passive tracking capability is made and it is concluded that an r-f differencing monopulse type tracker can provide the required angle tracking performance over the r-f tuning range of 0.1 KMc to 18 KMc, with this range divided into six bands. Various receiver and calibration systems are analyzed and it is concluded that the receiver tuning units and calibration generators should be located within the antenna pedestal. Transmission of signals to the main equipment location can then be made at i-f frequencies. The required signal data processing is analyzed from the standpoint of two system configurations; one employing a raw data recording system which permits data processing at any time after flight data is taken, and one employing a general-purpose digital computer for real-time data processing during the flight. (Author)

AD-426 762 Div. 8
OTS price $1.60

Technical Services Lab., Picatinny Arsenal, Dover, N. J.
DESIGN AND APPLICATION OF AN INCREMENTAL MAGNETIC COUNTER,
by Edward A. Gurtler. Jan 64, 16p.
PA TM1304 2 Unclassified report

Descriptors: (*Magnetic cores, Scalers), (*Scalers, Magnetic cores), Pulse generators, Transistors, Timing circuits, Magnetic core storage, Switching circuits, Electric potential, Hyseresis.

Presented are 5 phases of the work on incremental counters by the Instrumentation Section: (1) a short explanation of the incremental technique, (2) an investigation of core characteristics with the incremental technique as an application, (3) the steps taken to design an operational incremental counter, (4) an explanation of the operation of the aforementioned counter, and (5) a proposed program for an end item fuze timer. The incremental counter used a torroidal magnetic core which stores an increment of flux for each cycle of operation of the driving oscillator. One cycle of oscillator operation is shaped or formed into a pulse of some voltage time. This pulse is then fed to a core which stores an increment of flux generated by the voltage time pulse. (Author)

AD-426 765 Div. 8
OTS price $5.60

Airborne Instruments Lab., Inc., Deer Park, N. Y.
FREQUENCY MULTIPLIER.
Quarterly progress rept. no. 1, 1 July-30 Sep 63,
by J. J. Taub and G. P. Kurpis. Sep 63, 56p.
Contract DA36 039AMC03196E, Proj. 3A99 15 004
Unclassified report

Descriptors: (*Frequency multipliers, Varactor diodes), (*Varactor diodes, Frequency multipliers), Superhigh frequency, Extremely high frequency, Microwave frequency, X band, K band, Effectiveness, Band-pass filters, Diodes (Semiconductors), Frequency, Stability, Test equipment (Electronic), Tests.

An analysis of the efficiency of varactor multipliers is discussed and related to the design of multimeter doublers. Varactor triplers and quadruplers, and the use of varistors, are considered and found to be less efficient than varactor doublers. The optimum drive level is discussed and is found to be a compromise between efficiency and frequency stability. An experimental 50 to 100 gc doubler was designed and constructed. No 100-gc output power was observed in a first test of the device. Experimental results on X- to K-band doublers are presented and efficiencies of -10 db were measured. (Author)

AD-426 802 Div. 8
OTS price $2.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HIGH TEMPERATURE ANTENNA INVESTIGATION AND DEVELOPMENT.
Interim engineering rept. no. 3 for period ending 31 Dec 63,
by G. F. Buranich. 31 Dec 63, 21p. Rept. no. UB1807E3
Contract AF33 657 11100, Proj. 6278, Task 627 802
Unclassified report

Descriptors: (*Antennas, High temperature research), (*Radomes, High temperature research), (*Concrete, Foams), Standing wave ratios, S band, Waveguides, Radar antennas.

This quarterly report summarizes engineering effort investigating the design of antennas which are suitable for prolonged operation at a temperature of 2000 F or higher. A niobium S-band waveguide assembly has been ordered, and it will be used as an open-ended waveguide antenna mounted in a ground plane. A ceramic window will be used to seal the aperture. A two-inch thick foamed concrete radome was made, and silicon carbide heating elements were inserted through it. An input of about 3 kw to the heating elements was sufficient to heat a stainless steel S-band waveguide with an alumina window mounted in a ground plane to a temperature of 2000 F. VSWR measurements were made on this (unmatched) assembly over a temperature range of 70 to 2000 F. The VSWR of 6.0 at room temperature increased to 6.8 at 2000 F. Work continues on the study of materials whose characteristics may be useful in this program. (Author)

AD-426 811 Div. 8
OTS price $1.60

Edgerton, Germeshausen and Grier Inc., Boston, Mass.
DEVELOPMENT OF A SUPER POWER DEUTERIUM THYRATRON.
Quarterly rept. no. 2, 13 Sep-13 Dec 63,
by Nicholas Reinhardt. 10 Jan 64, 8p. Rept. no. B2714
Contract NObsr89405, Proj. SR0080301, Task 9434
Unclassified report

Descriptors: (*Thyratrons, Manufacturing methods), (*Manufacturing methods, Production), Deuterium, Electron tube parts, Electric potential, Cathodes (Electron tubes), Brazing, Aging (Materials), Performance (Engineering), Ceramic materials, Power.

Six more prototype super-power deuterium thyratrons were evaluated. Five of these (tubes 18 through 22) were new starts undertaken during the reporting period; one (tube 17) was a tube built during the first quarter. No changes were made in the basic tube design configuration although some modifications were made in the fabrication of the separate starts. The processing of the tubes undertaken during this period and the evaluation of same are given in detail. (Author)

AD-426 813 Div. 8, 5
OTS price $1.10

Aeronautical Instruments Lab., Naval Air Development Center, Johnsville, Pa.
APPLICATION OF THE STEREOSCOPIC EFFECT FOR DISPLAY ENHANCEMENT.
20 Dec 63, 4p.
NADC AI6386 Unclassified report

Descriptors: (*Stereoscopic display systems, Design), Instrumentation, Lenses, Prisms (Optics), Cameras, Television display systems, Mirrors.

AD-426 844 Div. 8
OTS price $7.60

Sylvania Electric Products Inc., Buffalo, N. Y.
ELECTRONICALLY STEERABLE ARRAY FOR SPACE VEHICLE APPLICATIONS.
Quarterly rept. no. 2.
Dec 63, 73p.
Contract AF30 602 3041, Proj. 4506, Task 450604
RADC TDR63 463 Unclassified report

Descriptors: (*Lens antennas, Optical scanning), (*Optical scanning, Beams (Electromagnetic)), Scattering, Electronic scanners, Ferrites, Diffraction gratings, Diffraction, Collimators, Propagation, Dielectrics, Photoelectric materials, Semiconductors, Impedance matching, Optical properties.

Collimating devices are studied and their characteristics are given. A scattering analysis is made for an array of scattering elements. Work continued on the ferrite steering analysis with major effort concentrated on impedance matching. Diffraction grating analysis was begun, and the properties of two types of grating structures are given. The fabrication of a variable grating is considered in terms of the control mechanism and materials. The projected plans include definition of performance, material procurement and investigation of properties, design of experiments, and the initiation of experimental work. (Author)

AD-426 845 Div. 8, 25
OTS price $4.60

Illinois U., Urbana.
NON-OHMIC TRANSPORT IN SEMICONDUCTORS IN A MAGNETIC FIELD,
by D. Matz and F. Garcia-Moliner. 6 Jan 64, 43p.
Contract Nonr183412
Unclassified report

Descriptors: (*Semiconductors, Magnetic fields), Theory, Germanium, Electrons, Experimental data, Electric fields, Scattering, Acceleration, Hall effect, Phonons, Mathematical models, Temperature, Resistance (Electrical).

Shockley's hot electron picture for semiconductors in high electron fields is extended to include arbitrary (though non-quantizing) magnetic fields. While preserving the original simplicity of Shockley's model, its scope can be extended by including a reduction of the power input due to the deflection caused by the Lorentz force. Explicit calculations are carried out for an idealized isotropic model which Conwell used to interpret the experimental data for n-Ge in zero magnetic field. This involves interactions of electrons with acoustic and covalent optical modes. This model calculation is designed to illustrate the main physical features of the extended Shockley picture. The results here obtained are used to discuss the kind of information which can be expected from different types of experiments and some suggestions are made for some relevant measurements yet to be done. Other scattering mechanisms are briefly discussed. (Author)

AD-426 887 Div. 8, 30
OTS price $5.60

Stanford Electronics Labs., Stanford U., Calif.
BASIC ELECTRONICS RESEARCH.
Quarterly status rept. no. 23, 1 Apr-30 June 60.
30 June 60, 40p.
Contract Nonr225 24, Proj. NR373 360
Unclassified report

Descriptors: (*Electronics, Scientific research), Parametric amplifiers, Microwave equipment, Electron tubes, Noise (Radio), Plasma sheaths, Ferromagnetic materials, Electric filters, Transistors, Distortion,

Networks, Analog systems, Control systems, Propagation, Resonators, Redundant components, Switching circuits, Avalanche diodes, Nonlinear systems, Optimation, Adaptive control systems, Scattering, Ceramic capacitors, Silicon compounds, Oxides, Communication theory.

Contents: Microwave Tubes; Variable-parameter amplifiers, Noise studies, Ferrimagnetic filters and resonators, Transistor Research; Network Studies; Nonlinear network analysis and synthesis, Control Systems; Propagation.

AD-426 903 Div. 8
OTS price $2.60

Naval Air Development Center, Johnsville, Pa.
SPECIFICATION MODULAR ASSEMBLIES, MICROELECTRONIC, GENERAL SPECIFICATION FOR.
20 Oct 61, 15p.
NADC EL 5 13A Unclassified report

Supersedes NADC EL5 13.

Descriptors: (*Modules (Electronic), Specifications), Microminiaturization (Electronics), Test methods, Naval equipment, Airborne.

This specification covers the general requirements for microelectronic modular assemblies of various types. Detail requirements for specific assemblies are stated in item requirements sheets, to be prepared by the contractor, and submitted for review by NAVAIRDEVCEN. Modular assemblies covered by this specification will be used in AVIONICS systems. (Author)

AD-426 908 Div. 8, 5, 1
OTS price $14.50

Sperry Gyroscope Co., Great Neck, N. Y.
EXPERIMENTAL EVALUATION OF COMPATIBLE PWI/CAS INTERROGATOR-TRANSPONDER TECHNIQUES. VOLUME 2.
Interim rept.
Sep 63, Rept. no. EB5261 0341 2
Contract FAA ARDS444
Unclassified report

Descriptors: (*Air traffic control systems, Electronic equipment), (*Electronic equipment, Wiring diagrams), Coding, Computers, Power supplies, Switching circuits, Amplifiers, Oscillators, Signal generators.

AD-426 909 Div. 8, 5, 1
OTS price $8.10

Sperry Gyroscope Co., Great Neck, N. Y.
EXPERIMENTAL EVALUATION OF COMPATIBLE PWI/CAS INTERROGATOR-TRANSPONDER TECHNIQUES. VOLUME I.
Interim rept.
Sep 63, 1v. Sperry Rept. no. EB5261 0341 1
Contract FAA ARDS444
Unclassified report

Descriptors: (*Air traffic control systems, Electronic equipment), (*Electronic equipment, Performance tests), Antennas, Radar beacons, Transponders, Scanning, Velocity, Ranges (Distance), Omnidirectional antennas, Radiofrequency interference, Antenna lobes, Communication equipment, Display systems, Aircraft, Jet planes, Noise (Radio), Test methods, Warning systems, Digital computers.

The results of an experimental evaluation of interrogation-transponder techniques are presented as applied to the airborne Pilot Warning Indicator (PWI) and Collision Avoidance System (CAS) problem. Both PWI and CAS are referenced because the system is designed to provide both levels of collision prevention capability on a mutually compatible basis in terms of transmitted signals. (Author)

AD-426 916 Div. 8, 25
OTS price $8.60

Shockley Transistor Div., Clevite Transistor, Palo Alto, Calif.
STRUCTURAL IMPERFECTIONS IN SILICON P-N JUNCTIONS.
Final rept., 15 July 62-15 Sep 63,
by A. Goetzberger and R. H. Finch. Oct 63, 1v.
Contract AF19 604 8060, Proj. 4608
AFCRL 63 538 Unclassified report

Descriptors: (*Silicon, Semiconductors), (*Semiconductors, Silicon), (*Diodes (Semiconductors), Silicon), Crystal lattice defects, Diffusion, Semiconductor devices, Stresses, Noise, Etched crystals, Deformation, Emissivity, Heat treatment, Solid state physics.

Investigations of imperfections in pn junctions continued. The avalanche effect and its relationship to imperfections was studied. Diffusion technology suitable for the achievement of uniform avalanche breakdown diodes permitted detailed study of some known effects and discovery of new phenomenon. It was found that the application of an isotropic stress to a pn junction reversibly lowers the breakdown voltage. Microplasma breakdown at stacking faults in epitaxially grown Si is discussed. It was shown for the first time that stacking faults, a very frequent imperfection in epitaxial Si, have a deleterious effect on device properties. Other studies included: avalanche noise in uniform junctions and microplasmas; avalanche light emission in uniform junctions which can be extinguished or enhanced by mechanical damage; improvement of diffusion technology. A review of avalanche breakdown in Si is included. (Author)

AD-426 919 Div. 8
OTS price $10.10

Purdue U. School of Electrical Engineering, Lafayette, Ind.
PHILOSOPHY AND STATE OF THE ART OF LEARNING CONTROL SYSTEMS,
by J. E. Gibson, K. S. Fu, J. D. Hill, J. A. Luisi and R. H. Raible. Nov 63, 118p. Rept. no. TR EE63 7
Grant AF AFOSR62 351
AFOSR 5144 Unclassified report

Descriptors: (*Control systems, Learning), (*Learning, Control systems), Psychology, Pattern recognition, Simulation, Nerve cells, Environmental tests, Measurement, Computers, Machines, Networks.

It also includes a brief description and discussion of the learning devices proposed in the literature. Chapter 2 gives the Purdue CISL Approach to learning systems. A learning process is defined as applied to control engineering. A discussion of adaptivity and its relationship to learning is included. Chapter 3 presents several different experimental and theoretical approaches to learning control systems which are currently being investigated at Purdue. Some preliminary results on these systems are included. (Author)

AD-426 932 Div. 8, 12
OTS price $5.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
MISSILE-BORNE TRACKING ANTENNA.
Final progress rept. for 1963,
by James E. Howell. 9 July 63, 52p.
AMC RA RG TR63 20 Unclassified report

Descriptors: (*Guided missile antennas, Electronic scanners), Phase measurement, Polarization, Automatic, Tracking, Antenna feeds, Impedance matching, Coaxial cables, Antenna configurations, Antenna lobes, Superhigh frequency, Helical antennas, Spiral antennas, Printed circuits, Chemical milling, Cavity resonators, Grain, Phase shifters, Antenna radiation patterns.

The development of electronically steerable, automatically self-directing, missile-borne antennas is described. The literature was searched and a preliminary study was made on the use of circularly polarized antennas for producing the necessary phase shifts required in the lobing of antenna arrays. Helical antennas were used first in tests around 5,000 mc in an effort to determine the phasing characteristics and feasibility of circularly polarized antennas. Next, a cavity-backed Archimedean spiral antenna and balun were designed and fabricated for 5,000-mc operation. A logarithmic spiral antenna was also designed and fabricated for use in the developmental antenna tests. The spiral antennas were fabricated from copper clad board by printed circuit etching techniques. Some of the problems encountered during laboratory tests were balun unbalance, radiation from the balun and the detrimental effects of the reflected wave when using cavities. (Author)

AD-426 953 Div. 8, 25
OTS price $6.60

Georgia Inst. of Tech., Engineering Experiment Station, Atlanta.
QUARTZ CRYSTAL AGING EFFECTS.
Quarterly rept. no. 2, 15 May-15 Aug 63,
by R. B. Belser, W. H. Hicklin and R. A. Young. 15 Aug 63, 52p.
Contract DA36 039AMC02251E, Projs. 1G6 2201 001A058 01 07 and A60
Unclassified report

Descriptors: (*Quartz resonators, Aging (Materials)), X-ray diffraction analysis, Nuclear particles, Cesium, Radioactive isotopes, Gold, Metal coatings, Crystal substructure, Strain (Mechanics).

One hundred resonators of 16 Mc fundamental frequency for operation at the 3rd mode have been completed and are presently undergoing aging measurements at 85 C. Q values of resonators exposed to irradiation from the Cs-137 source (34 x 10 to the 6th power rads in 24 hours) during the First Quarter were found to have changed in accordance with the species of quartz. The Q of natural and cultured quartz resonators was degraded by about 25% whereas that of swept natural and swept cultured quartz was little changed. Forty 10 Mc resonators, plated with Au + Au, were fabricated for reliability studies. Aging studies of 34 of these at 85 C were conducted. Aging after 30 days was acceptable for all units passing the acceptance standards, and was commonly less than 3 parts in 10 to the 8th power per week. X-ray diffraction source image distortion (SID) patterns have been made of 15 resonators, with known aging histories or with pecularities in behavior detected during electrical measurements. The x-ray diffraction SID technique has displayed a high incidence of strain among units examined and suggests the need for a mount design less likely to exert high stress. (Author)

AD-426 956 Div. 8, 26
OTS price $5.60

Westinghouse Electric Corp., Elkridge, Md.
MICROMINIATURE INTEGRATED CIRCUIT PACKAGE.
Final rept., 1 July 62-1 Aug 63,
by E. P. Barbaro. 1 Aug 63, 49p.
Contract DA36 039sc90850, Proj. 3A99 21 002 01
Unclassified report

Descriptors: (*Integrated circuits, Microminiaturization (Electronics)), (*Microminiaturization (Electronics), Integrated circuits), Ceramic materials, Glass, Encapsulation, Silicon, Electric terminals, Gold, Modules (Electronic), Manufacturing methods, Germanium, Cleaning, Bonding, Seals (Stoppers), Environmental tests, Production.

Design and fabrication of two metal to glass seal microminiature integrated circuit packages were completed. One which utilized the .310 inch square ceramic base as an integral portion of the package and the other a .225 in. square package per the stated requirements of the contact. The .310 in. square package required more development as leak rates of only less than 1 x 10 to the minus 6 power cc/sec at one atmosphere were achieved. However, on the contract package lead rates less than 1 x 10 to the minus 8 power cc/sec at one atmosphere were attained. This was accomplished through revisions of graphite molds, glass preform designs, kovar oxide layer control and sealing techniques. To prove package feasibility, twenty-four Westinghouse Functional Electronic Blocks were encapsulated in the .225 in. square microminiature planar package. No problems in assembly were encountered. (Author)

AD-426 970 Div. 8
OTS price $1.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
ANTENNA WINDOW: A TECHNIQUE FOR PROPAGATION THROUGH A PLASMA SHEATH.
Interim engineering rept. no. 10, 15 Sep-15 Dec 63,
by Robert G. DeLosh. 15 Dec 63, 10p. Rept. nos. BSR841 and BPSN6799 760K4062
Contract AF33 616 8420
Unclassified report

Descriptors: (*Antennas, Plasma sheath), (*Propagation, Plasma sheath), (*Plasma sheath, Propagation), Helical antennas, Test vehicles, Reentry vehicles, Waveguide windows, Instrumentation, Gain, Antenna radiation patterns, Solenoids, Liquefied gases, Helium, Cooling, Embedding substances, Superconductors.

The flight-test instrumentation package is complete, with the exception of the coolant line plumbing within the vehicle. Measurements of the potted helical antenna gain, beamwidth and ellipticity were made and found to be adequate for the flight test. Work is progressing on the design of an antenna window system which will utilize in-flight cooling. Two techniques, the use of liquid helium and Peltier coolers, are being considered for cooling the solenoid. Testing of small superconducting solenoids was continued. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-426 997 Div. 8
OTS price $8.60

Columbia U. School of Engineering, New York.
SURFACE WAVE GUIDING AND RADIATING SYSTEMS,
by S. P. Schlesinger, P. Diament, and V. L. Granatstein. Mar 63, 86p. Rept. no. CU25 62; SR80
Contract AF19 604 3879, Proj. 4600, Task 46004
AFCRL 63 522 Unclassified report

Descriptors: (*Propagation, Communication theory), (*Electromagnetic waves, Propagation), Structures, Structural shells, Partial differential equations, Geometric forms, Cylindrical bodies, Plasma medium, Density, Perturbation theory, Electric potential, Tuning devices, Ferroelectric materials, Binders, Surface properties, Electromagnetic fields, Waveguides, Transmission lines.

Research concerned a fundamental theoretical study of open-structural guiding and radiating systems with emphasis on varying degrees of generalization of mode-type and media properties, and a study, in detail, of specific novel open structures showing some promise of utility. The reformulation is given of Maxwell's equations and their solution for the broadest generalization possible as regards medium properties and geometrical cross section in which the only restriction is that of linearity. A method of treating guiding open cylindrical systems numerically is outlined and is applied to the case of a radial inhomogeneity. A study is presented directed toward a complete analysis and cataloging of all classes of high frequency guided waves (infinite ion mass) on an open magnetoplasma column with density inhomogeneity treated by a perturbation technique. The V-line structure is discussed. The V-line is a voltage tunable radiating element using a ferroelectric of modest tuneability as a binding medium. Research carried out on a class of low loss, low permittivity ferroelectric materials is also presented. (Author)

9. FLUID MECHANICS

AD-426 543 Div. 9, 1
OTS price $10.10

Computer Engineering Associates, Inc., Pasadena, Calif.
LOW FREQUENCY INSTABILITIES OF FREE SYSTEMS. Final rept., Mar 62-Aug 63,
by Robert G. Schwendler and Jack H. Hill. Nov 63, 116p.
Contract AF33 657 8293, Proj. 8219, Task 821901
ASD TDR63 655 Unclassified report

Descriptors: (*Airframes, Stability), (*Aeroelasticity, Mathematical prediction), Aerodynamic configurations, Structural shells, Fuselages, Canard configurations, Cylindrical bodies, Airfoils, Structural properties, Flutter.

'Mode interaction' instabilities of aircraft were investigated. 'Mode interaction' refers to coupling between an elastic mode and a rigid body mode of the free system. Three rather general airframe configurations are analyzed in detail. It is shown that systems which tend toward steady state divergence are particularly susceptible to mode interaction. Also, that aerodynamic damping terms can have a destabilizing effect upon a free system. The analyses show that aeroelastic systems which possess no finite frequency elastic mode can be susceptible to a finite frequency instability. Computer studies of several different airframe configurations are discussed. An appendix contains stability charts for an aircraft having two rigid body modes and one elastic mode. (Author)

AD-426 676 Div. 9
OTS price $4.60

Naval Weapons Lab., Dahlgren, Va.
SYMMETRIC STAGNATION AND WAKE FLOWS PAST A SEMI-INFINITE PLATE,
by Ernst W. Schwiderski and Hans J. Lugt. Sep 63, 45p.
NWL 1886 Unclassified report

Descriptors: (*Flat plate models, Laminar boundary layer), Leading edge, Trailing control surfaces, Fluid flow, Aerodynamic characteristics, Aerodynamic control surfaces, Partial differential equations, Mathematical analysis, Boundary layer transition, Separation, Axially symmetric flow, Wake, Stagnation point, Equations, Theory.

The class of all solutions of the Navier-Stokes equations which represent symmetric motions past a semi-infinite flat plate is constructed in the form of a double series around the edge of the plate. In contrast to the classical boundary layer equations, the Navier-Stokes equations emerge as a proper means to describe laminar flows past leading and trailing edges in a realistic manner and, hence, justify the great confidence which they own by derivation. Flow patterns of laminar attached or separated motions around leading and trailing edges can be derived up to very refined details from the solutions obtained. An interesting remark on the analogous needle problem is added. (Author)

AD-426 715 Div. 9
OTS price $1.60

Vehicle Research Corp., Pasadena, Calif.
A LIFTING SURFACE THEORY FOR WINGS AT HIGH ANGLES OF ATTACK EXTENDING THROUGH INCLINED JETS,
by T. Yao-Tsu Wu. 21 Oct 63, 10p. Rept. no. 9a
Contract Nonr238800
Unclassified report

Descriptors: (*Wings, Lift), (*Incompressible flow, Theory), Aerodynamic characteristics, Angle of attack, Propellers (Aerial), Jet planes, Drag, Deflection, Surfaces, Hovering, Tilt wings, Perturbation theory.

The third part of the three part High Angle of Attack Theory is presented. The preceding two parts have been published as VRC Report No. 9. The three parts comprise Phase III of VRC's program of developing methods for assessing the non-uniform flow fields of wing-propeller slipstream aerodynamics. This effort consists of the following three parts: (1) wings at various heights in the jet; (2) highly cambered wings as used in deflected slipstream V/STOL arrangements; and (3) tilt wing configurations where the jet is inclined to the free stream flow. Analytical evaluation is presented of the complex flow field encountered by tilt-wing V/STOL aircraft (Vertol 76, Hiller X-18, Tri-Service XC-142, etc.). The analysis provides methods for determining the spanwise life distribution and induced drag of such aircraft. It thus provides a tool for determining tilt wing arrangements of maximum lift and minimum induced drag. (Author)

AD-426 734 Div. 9, 25
OTS price $10.10

Little, Arthur D., Inc., Cambridge, Mass.
VERTICAL MOTION OF HIGH ALTITUDE BALLOONS,
by I. W. Dingwell, W. K. Sepetoski and R. M. Lucas. Dec 63, 119p. Rept. no. C62944; TR2
Contract Nonr3164 00
Unclassified report

Descriptors: (*Balloons, High altitude), (*Thermal radiation, Infrared phenomena), (*Heat transfer, Convection), Programming (Computers), Numerical analysis, Motion, Atmosphere, Solar radiation, Absorption, Helium, Air, Blackbody radiation, Energy, Gases, Temperature, Flight, Equations, Mathematical models, Data.

The equations are given which govern balloon performance and which have been integrated numerically and programmed on an IBM 7090 digital computer in FORTRAN. This mathematical model of high altitude balloons has been in operation for a year. During this period, the results of the computer program were compared with existing data of the Stratoscope II and Stargazer Flights. As might be expected, the first analysis was incomplete, and the program was modified to improve the correlation between computed and actual flight trajectories. In this second report of the series, the mathematical model is described and instructions are given for the operation of the program. (Author)

AD-426 784 Div. 9
OTS price $2.60

Mississippi State U., State College.
SOME CHARACTERISTICS OF THE TURBULENT BOUNDARY LAYER,
by J. J. Cornish. Dec 63, 21p. Aerophysics research note no. 18
Contract DA44 177AMC892, Task 1D121401A14203
ATRECOM TR63 74 Unclassified report

Descriptors: (*Turbulent boundary layers, Equation), Theory, Wake, Fluid flow, Separation, Shear stresses.

A theoretical investigation was made of the turbulent boundary layer. The purpose was to derive relations on the characteristics of the boundary layer and to compare them with experimental data. (Author)

AD-426 795 Div. 9, 8, 25, 15
OTS price $5.60

Illinois U., Engineering Experiment Station, Urbana.
A NEW TECHNIQUE FOR SOLVING A CLASS OF BOUNDARY VALUE PROBLEMS,
by R. Mittra and J. R. Pace. Sep 63, 48p. TR72
Contract AF33 657 10474, Proj. 6278, Task 6278 01
Unclassified report

Descriptors: (*Boundary value problem, Series), Wave guides, Networks, Matrix algebra, Diffraction gratings, Scattering, Reflection, Determinants, Bibliographies.

An exact solution, in a series form, is formulated for a wide class of problems for which no such solutions are available at the present time. These problems are characterized by the fact that they are related to an auxiliary problem for which an exact solution in terms of Wiener-Hopf, function theoretic, or other methods, is available. It is shown that the solution of the given problem may be developed in a series form, the coefficients involved being expressible in terms of the known scattering coefficients of the auxiliary problem. (Author)

AD-426 896 Div. 9, 15
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
INTEGRAL-MOMENT METHOD OF SOLVING THE BOLTZMANN KINETIC EQUATION,
by M. N. Kogan. 3 Dec 63, 11p.
FTD TT63 1033 Unclassified report

Trans. from Zhurnal Prikladnoy Mekhanika I Tekhnicheskoy Fiziki, No. 3, pp. 36-40, 1963.

Descriptors: (*Kinetic theory, Gases), Helium group gases, Gas flow, Fluids, Motion, Dynamics, Thermodynamics, Fluid mechanics, Equations, Special junctions, Integrals, Moments, Numerical analysis, Fluid flow, Viscosity.

A method is proposed which enables computation of the flow of a gas, in principle, with an arbitrary Knudsen number. This method is convenient for solving problems where the Knudsen numbers are not too small. (Author)

AD-426 914 Div. 9, 31
OTS price $8.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
MODEL TESTS OF A SERIES OF SIX PATROL BOATS IN SMOOTH AND ROUGH WATER,
by Young Chey. Oct 63, 1v. Rept. no. 985
Contract NObs78349, Proj. 2648 230
Unclassified report

Descriptors: (*Patrol craft, Water waves), Hydrodynamic configurations, Model tests, Hulls (Marine), Design, Hydrodynamics, Performance engineering, Water impingement, Yaw, Planing surfaces, Experimental data, Tables, Photographs.

Three round-bottom models and three hard-chine models, with length-beam ratios of 3, 4 and 5 in each group and with constant displacement, were tested in smooth water and in irregular waves of Sea States 3 and 5. The hard-chine model and the round-bottom model of length-beam ratio 4 were used to evaluate relative broaching tendencies in regular following waves. The resistance data in smooth and rough water were expanded to boat weights of 55,000 lbs. The measured values, of acclerations at the forward quarter point and LCG position and of heave, are presented. In the evaluation of relative broaching tendencies in regular following waves, experimental results were combined with theoretical results to derive indices of broaching. (Author)

AD-426 955 Div. 9
OTS price $3.60

Mechanical Technology, Inc., Latham, N. Y.
RESEARCH ON GAS LUBRICATION AT HIGH TEMPERATURE AND LOW FLOW RATES.
Quarterly progress rept. no. 3,
by P. Lewis and J. Meacher. 27 Dec 63, 21p.
Rept. no. 63TR60
Contract AF33 657 10694
Unclassified report

Descriptors: (*Gas bearings, Stability), Gas flow, Bearings, Hydrostatic pressure, Orifices.

The instability of the hybrid gas journal bearing

is investigated analytically. The bearing is supplied with pressurized air through orifices in the centerplane which is approximated by a line source. The gas film equation, Reynolds equation, is solved by the linearized Ph-method including the hydrostatic pressure effect and used to generate the coefficients for the determination of the threshold of instability. The equations are solved by numerical integration. The results for threshold speed and frequency are given in the form of graphs. Comparison with experimental data shows qualitative agreement but quantitatively there are discrepancies of as much as 2:1. This is believed to be caused by too simple an orifice representation whereas the gas film in itself should be correctly treated. A method for correction is discussed. (Author)

AD-426 965 Div. 9, 6, 15
OTS price $6.60

Coordinated Science Lab., U. of Illinois, Urbana.
MINIMIZATION OF ATMOSPHERIC TURBULENCE EFFECTS ON HIGH-RESOLUTION SYNTHETIC APERTURE SYSTEMS,
by Dale M. Diamond. Sep 63, 63p. Rept. no. R179
Contract DA36 039AMC02208E, Proj. 3A99 25 004
Unclassified report

Descriptors: (*Search radar), Turbulence), (*Side-looking radar, Turbulence), Radar, Radar equipment, Mathematical models, Resolution, Atmosphere, Mapping, Fourier analysis, Series, Simulation, Computers, Radar antennas, Troposphere.

A method of processing the received signals in a synthetic aperture radar system to remove the effects of atmospheric turbulence is proposed. An appropriate mathematical model of the synthetic system and the manner in which it is affected by atmospheric turbulence is developed. The model thus developed is used as the basis for a processing procedure which matches the first few terms of a Fourier series to the phase error effect caused by the atmospheric turbulence. Several examples of a computer simulation are used to illustrate the results of such processing. (Author)

AD-426 989 Div. 9
OTS price $2.00

Carnegie Inst. of Tech., Pittsburgh, Pa.
UNCONVENTIONAL METHODS FOR INFLUENCING FLUID FLOW. VOL. III. AN ION DRAG PUMP AND THRUST BEARING.
Final rept.,
by Charles A. Timko. Nov 63, 69p.
Contract AF33 657 9914, Proj. 8169, Task 816904
ASD TDR63 776, vol. 3 Unclassified report

Descriptors: (*Thrust bearings, Fluid flow), (*Fluid flow, Pumps), Electromagnetic pumps, Dielectrics, Electric fields, Mineral oils, Pressure.

The ion-drag effect in which like-charge ions generated by corona are forced through a dielectric fluid by an electric field is investigated as a means of pressurizing fluids without the use of moving mechanical parts. A thrust bearing and a pump operating on this principle are studied both theoretically and experimentally. A mineral oil is used in the experiment as the working fluid. The effect is found to be quite small although flow rates greater than those obtained by previous investigators are observed. Experiments verified the analytic results of the pump and thrust bearing study. Other currents than the like-charge ionic current were found present. Also, the pressure effect decreased with time when mineral oil was used as the pumping medium. (Author)

10. FUELS AND COMBUSTION

AD-426 940 Div. 10
OTS price $5.60

Naples U. (Italy).
EXPERIMENTAL ANALYSIS OF THE DIESEL FUELS PERFORMANCES ON THE PHENOMENON OF THE DEPOSITS FORMATIONS.
Final technical rept., 1 Aug 62-31 July 63.
31 July 63, 1v.
Contract DA91 591EUC2669
Unclassified report

Descriptors: (*Diesel engines, Fuels), (*Fuels, Diesel engines), (*Combustion deposits, Diesel engines), Test methods, Density, Sulfur, Carbon compounds, Sulfides, Esters, Nitrates, Fuel additivies, Ethers, Aromatic compounds, Piston rings, Pistons, Injectors, Nozzles, Kerosene, Water, Coolants, Tests.

The purpose of this research is to analyze the influence of fuel characteristics on deposits formation in high-speed diesel engines. Parameters investigated were: specific gravity, sulphur content, and cetane number. The program included, in a first formulation, 72 engine tests, but a restricted research program of only 20 tests was elaborated. The execution of the remaining 52 engine tests will be performed later. Tests were performed on the Petter AV1 engine under standard running conditions. Deposits formed on the piston and in the injector nozzle were analyzed. Two gasoils of different specific gravities (0.823 and 0.854 respectively) were tested. The sulphur content of these gasoils was obtained by addition of CS2, while the scheduled values of the Cetane number were obtained by addition of ethyl-nitrate. The results are not conclusive in regard to the influence the characteristics of the gasoil have on deposit formation, but they represent a necessary starting point for the future research program of the other 52 engine tests. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

12. GUIDED MISSILES

AD-426 512 Div. 12, 23
OTS price $1.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). FACILITIES DESIGN CRITERIA MISSILE PROCEDURES TRAINING BUILDING VANDENBERG AFB,
by G. W. Greene. 18 Nov 63, 16p. Rept. no. MPO SR17 101
Contract AF04 694 261
Unclassified report

Descriptors: (*Launching sites, Training), Air Force, Guided missiles (Surface-to-surface), Guided missile launchers, Guided missile personnel, Launching, Buildings, Specifications, Military facilities, Control, Guided missile simulators, Ground support equipment, Electronics.

AD-426 523 Div. 12, 27
OTS price $3.60

Naval Research Lab., Washington, D. C.
ACCELERATION AND VIBRATION DATA FROM JAVELIN (8.02) VEHICLE,
by M. W. Oleson. July 60, 30p.
NRL MR1074 Unclassified report

Descriptors: (*Rocket motors (Solid propellants), Fourth stage motors), (*Sounding rockets, Vibration), Booster motors, Thrust, Acceleration, Payload, Instrumentation, Shock (Mechanics), Ignition, Radio interference, Staging, Performance (Engineering), Telemetering data.

Javelin (8.02) was the second of two similar vehicles flown for the primary purpose of obtaining in-flight vibration measurements. Results from this flight indicate that random vibration levels were quite low, high frequency quasi-periodic vibrations were induced during burning of the X-248 fourth stage motor, and substantial shocks occurred at ignition of all four Javelin stages. In addition, operation of the X-248 motor was abnormal. Comparison with the earlier Javelin (8.01) flight indicates that there were substantial differences in the vibration data, reflecting changes in the flight performances. (Author)

AD-426 531 Div. 12, 13
OTS price $5.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). FACILITIES DESIGN CRITERIA NEW OPERATIONAL STRATEGIC MISSILE SUPPORT BASES S-133-30-30-0-1,
by R. R. Cunningham. 27 Dec 63, 40p. Rept. no. MPO SR17 3 305
Contract AF04 694 261
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Ground support equipment), (*Ground support equipment, Guided missiles (Surface-to-surface)), (*Electronic equipment, Ground support equipment), Military facilities, Air Force, Checkout equipment, Electrical equipment, Communication systems, Safety, Personnel, Maintenance equipment, Guidance, Test equipment, Refrigeration systems, Handling, Storage, Specifications.

This document in its final form, will provide all necessary facilities criteria related to the Ground Electronics System (GES) of the WS-133B Minuteman Weapon System, to accomplish the design of the Strategic Missile Support Base (SMSB) for each wing. Additional technical criteria necessary for adapting the requirements of each selected Air Force Base installation will be issued in a supplemental document for each site. The supplementary document will contain only those technical requirements pertinent to the specific site adaptation. (Author)

AD-426 537 Div. 12, 30
OTS price $2.60

Sylvania Electric Products, Inc., Waltham, Mass.
GROUND ELECTRONICS SYSTEM FOR WS-133B (MINUTEMAN). PROGRAM PLAN FOR REPAIR OF PROTOTYPE EQUIPMENT.
30 Aug 63, 1v. Rept. no. MPO PD0012, R1
Contract AF04 694 261
Unclassified report

Descriptors: (*Ground support equipment, Electronic equipment), (*Maintenance, Ground support equipment), (*Research program administration, Management engineering), Guided missiles (Surface-to-surface), Guided missile components, Malfunctions, Reliability (Electronics), Military requirements, Specifications, Quality control.

The purpose of this document is to provide a complete, comprehensive program plan and to establish a procedure for repair of faulty Depot Level Assemblies during the testing phase of the Minuteman Ground Electronics System R & D Program. (Author)

AD-426 588 Div. 12
OTS price $2.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FOR FTM 443 EQUIPMENT COVERED BY THE FOLLOWING MODEL SPECS: S-133-1000-1-4, S-133-1000-1-5, S-133-1000-1-16, S-133-1000-1-17, S-133-1000-1-18, S-133-1000-1-19, S-133-1000-1-20,
by Carl J. Lesh. 9 Dec 63, 23p. Rept. no. D2 10889-2, Vol 63
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Military requirements), Guided missiles (Surface-to-surface), Air Force, Specifications, Quality control, Weapon systems.

AD-426 589 Div. 12
OTS price $4.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT FLIGHT TEST MISSILE 443, MODEL SPECIFICATION S-133-1007C,
by Carl J. Lesh. 9 Dec 63, 1v. Rept. no. D2 10889 1, Vol. 63
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missile components, Specifications), Guided missiles (Surface-to-surface), Quality control, Scheduling.

AD-426 662 Div. 12, 7
OTS price $1.60

Boeing Co., Seattle, Wash.
ENGINEERING EVALUATION TEST OF MCL 1970-R1 FOR STANDBY POWER SYSTEM,
by R. I. Corbett. 1 Oct 63, 12p. Rept. no. D2 15641 1
Contract AF04 647 757
Unclassified report

Descriptors: (*Launching sites, Stand-by generators), (*Stand-by generators, Switching circuits), Control systems, Circuits, Tests, Test equipment, Automatic, Diesel engines, Guided missiles (Surface-to-surface).

Tests were performed to determine the operating dependability of the control circuit and associated controls of the automatic switching unit of the stand-by power system of a launching site. The tests were performed with the automatic switching unit installed in place. The tests included the diesel-driven generator unit to verify test results and exercise controls associated with the generator unit or form a part of the switching unit. (Author)

AD-426 724 Div. 12, 30
OTS price $9.60

Aerospace Corp., Los Angeles, Calif.
MINUTES OF THE TENTH TECHNICAL DIRECTION MEETING - ATHENA PROGRAM 20-21 NOVEMBER 1963. BSD/AEROSPACE/ARC.
13 Dec 63, 108p. Rept. no. TOR269S4810 07 5
Contract AF04 695 269
Unclassified report

Descriptors: (*Sounding rockets, Research program administration), Air Force research, Rocket research, Scheduling, Design, Instrumentation, Manufacturing methods, Checkout procedures, Test vehicles, Reliability.

The Minutes of the Tenth Technical Direction Meeting for the ATHENA Program held at Aerospace Corporation, San Bernardino Operations, San Bernardino, California, 20-21 November is presented. (Author)

AD-426 773 Div. 12
OTS price $4.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT - FLIGHT TEST MISSILE 444, MODEL SPECIFICATION S-133-1007C,
by Carl J. Lesh. 20 Dec 63, 1v. Rept. no. D2 10889-1, Vol. 64
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Quality control), Air Force, Guided missile components, Specifications, Instrumentation, Electronic equipment, Electrical equipment, Tests, Vibration, Strategic weapons.

These data identify and describe the actual status of End Items, designated for First Article Customer Inspection or Team Acceptance review (Reference: AFBSD Exhibits 61-51 & 61-30). They include any Waivers or Deviations that exist or are required for Non-Conformance Items. Status reporting will be at the delivery level unless otherwise noted. Responsibility of maintenance to include Base Commitments is transferred to the Base Quality Control Planning Unit receiving the equipment. (Author)

AD-426 774 Div. 12
OTS price $6.60

Boeing Co., Seattle, Wash.
ACCEPTANCE SUMMARY REPORT - FTM 448 MODEL SPECIFICATION S-133-1000-0-1,
by R. J. Hemmestad. 31 Dec 63, 1v. Rept. no. D2 3929 448
Contract AF04 647 289
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Military requirements), Specifications, Test vehicles, Test facilities, Test methods, Acceptability, Guided missile components, Reliability, Strategic weapons.

The purpose of D2-3929 is to document an Acceptance Summary Report for Flight Test Missiles as required to support Final Acceptance activities at the Boeing Test Site. It provides evidence of Missile Configuration Identification and Certification. It defines deviations from compliance with the Airborne Vehicle Model Specification, S-133-1000-0-1. Reference Document D2-6272, Missile Functional Test Procedures, for a record of testing performed and for a record of specified Acceptance Test Measurements. Reference D2-9611, Failure and Time/Cycle Data, for a record of Reliability Data. (Author)

AD-426 790 Div. 12.
OTS price $18.50

Boeing Co., Seattle, Wash.
ELECTRO-INTERFERENCE COMPLIANCE OF WS 133A WEAPON SYSTEM COMPLEX AT VAFB.
Field test rept.
by A. D. Bird. 6 Aug 62, 1v. Document no. 2 13391
Contract AF04 647 757
Unclassified report

Descriptors: (*Guided missiles (Surface-to-surface), Checkout procedures), Military requirements, Electronic equipment, Specifications, Performance (Engineering).

AD-426 800 Div. 12, 8
OTS price $1.60

Sylvania Electric Products, Inc., Waltham, Mass.
FACILITIES DESIGN CRITERIA, STRATEGIC MISSILE SUPPORT BASE, WING VI - GRAND FORKS AIR FORCE BASE SUPPLEMENT,
by R. R. Cunningham. 6 Jan 64, 7p. Rept. no. MPO SR17 3 305 1
Contract AF04 694 261
Unclassified report

Report on Ground Electronics System for WS-133B (Minuteman).

Descriptors: (*Ground support equipment, Electronic equipment), (*Guided missiles (Surface-to-surface), Ground support equipment), Maintenance, Military facilities, Maintenance equipment, Communication equipment, Design, Storage, Test facilities, Air Force.

This document, in its final form, supplemented by Sylvania Document MPO-SR-17-3-304 - Facilities Design Criteria, New Operational Strategic Missile Support Bases, will provide the necessary facilities criteria to prepare construction drawings for the Wing VI Ground Electronics System (GES) SMSB facilities at Grand Forks AFB. Where the criteria in MPO-SR-17-3-304 is unchanged for Wing VI, it is not repeated in this document. Criteria for Wing VI SMSB requires joint occupancy by SMSB and CSA maintenance facilities of the 1st floor of existing Building 306 (SAGE). Other CSA and SAC facilities will be provided on the 2nd, 3rd and 4th floors of this building, but no SMSB facilities will be installed above the first floor. SMSB requirements for GES warehouse storage will be satisfied by partial occupancy of existing Warehouse Building 408. (Author)

AD-426 821 Div. 12
OTS price $8.60

Boeing Co., Seattle, Wash.
WS-133A SAFETY ANALYSES REPORTS. VOLUME V - OPERATIONAL GROUND EQUIPMENT,
by W. E. Heyl, P. J. Schwartz, and V. O. Julien.
10 Nov 61, rev. 16 Dec 63, 1v. Rept. no. D2 12298, vol. 5
Contract AF04 647 289
Unclassified report

Descriptors: (*Ground support equipment, Safety), (*Guided missiles (Surface to surface), Ground support equipment), Guided missile safety, Air force, Analysis.

AD-426 836 Div. 12, 7
OTS price $1.10

Boeing Co., Seattle, Wash.
ENGINEERING EVALUATION TEST FOR STANDBY POWER SYSTEM LF 00-02 THROUGH LF 00-07,
by R. I. Corbett. 12 Dec 63, 6p. Document no. T2 3203 1
Contract AF04 647 757
Unclassified report

Descriptors: (*Stand-by generators, Failure (Mechanics)), Launching sites, Weapon systems, Ground support equipment, Guided missiles (Surface-to-surface), Temperature, Diesel engines, Engine air systems components, Cooling, Cooling & ventilating equipment, Tests.

The test involved 25 simulated power failures at each of four facilities and a 5 day indurance run at one facility but using a maximum of three facilities if equipment failures make this necessary. Measurements were made of the cooling airflow to the diesel engine during the endurance run. The standby power system is not sufficiently reliable for the Minuteman system in either automatic starting or sustained operation. The very high temperatures experience will also impair the performance of the equipment. (Author)

AD-426 869 Div. 12, 5, 8
OTS price $8.60

Boeing Co., Seattle, Wash.
COMPATIBILITY TEST REPORT -- HF RADIO EQUIPMENT AND HARD HF ANTENNA SYSTEM,
by T. Rooks. 27 Sep 63, 94p. Document no. T2 3139 1
Contract AF04 647 289
Unclassified report

Descriptors: (*Launching sites, Radio equipment), (*Radio equipment, Checkout procedures), (*Antennas, Checkout procedures), Guided missiles (Surface to surface), Test facilities, Scheduling, Test methods, Configuration, Radio-frequency, Power, Electrical impedance, Compatibility, High frequency.

Tests were conducted on HF Radio Equipment and Hard HF Antenna Systems. The test program checked electrical and mechanical interfaces, system operation and verified HF system assembly and checkout procedures. (Author)

AD-426 924 Div. 12, 30
OTS price $1.10

Martin-Marietta Corp., Baltimore, Md.
TITAN SCIENTIFIC PASSENGER POD -- ADDENDUM TO ANNEX FLIGHT TEST DIRECTIVE MISSILE N-31. XSM 68B -- WS-107A-2 PROGRAM,
by R. Moyer, L. Parker, W. Kaufmann and F. M. Hutchison, Jr. 1963, 6p.
Unclassified report

Addendum to rept. MT63 5603, AD-346 128.

Descriptors: (*Guided missiles (Surface to surface), External stores), Telemeter systems, Seals (Stoppers), Liquefied gases, Oxygen, Low temperature research, Low pressure research, Space environmental conditions, Instrumentation, Payload, Batteries and components, Power equipment parts, Air Force.

This Addendum together with the Basic Test Directive, Lot N, MT-61-78449 and the Annex Flight Test Directive, Missile N-31; MT-63-5603 specifies the AMR test program for the N-31 missile, USAF serial number 61-2754 and the scientific passenger pod (SPP) number T-206. The experiment 'Analysis of Zero G Liquid Oxygen Converter Operation During Sub-Orbital Flight' will be carried and the complete pod ejected from the missile shortly after SECO. The experiment will remain within the pod and will continue to transmit pressure, temperature, accelerometer and strain gauge data. The test period is from T-60 seconds to loss of signal. (Author)

AD-426 949 Div. 12, 23
OTS price $6.60

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
PERSHING GUIDED MISSILE TRAINER XM-19 MARRIAGE, ENGINEERING EVALUATION AND WEAPON SYSTEM TESTS. Final rept., 17 Dec 62-6 May 63,
by Brimage L. Smith and John F. Gassaway.
20 Dec 63, 57p.
Proj. 516 05 011
AMC RA RT TR63 12 Unclassified report

Descriptors: (*Training devices, Guided missiles (Surface-to-surface), (*Guided missiles (Surface-to-surface), Training devices), Mobile, Tactical weapons, Compatibility, Handling, Checkout procedures, Launching, Guided missile warheads, Installation, Navigation computers, Inverters, Stabilized platforms, Accelerometers, Transporter-erectors.

Results of the console/trainer compatibility test indicated no aparent incompatibility of equipment. The marriage of GMT-P S/N 002 with programmer test station from Artillery Set No. 5 was satisfactory and all trainer systems responded correctly to commands received from ground support equipment. The precision fixed resistors can be used on the summing amplifier-printed circuit cards to replace potentiometers now being used. This would eliminate existing alinement problems in the control system. The lathe bed azimuth laying system modification to the ST-120 stabilized platform simulator performed to design requirements. The variable-speed accelerometer simulator with minor modifications will meet the requirements of simulating different geographical locations and headings. The Block III guidance computer simulator satisfied the checkout requirements of the peripheral equipment within the programmer test station. Static inverters can replace the rotary inverter presently utilized in the guided missile trainer; however, the units tested did not have the required capacity. The AK simulator responded correctly to the preset values and inserted malfunctions. (Author)

AD-426 978 Div. 12
OTS price $2.60

Air Force Special Weapons Center, Kirtland Air Force Base, N. Mex.
WIND COMPENSATION SOLUTION FOR UNGUIDED SPACE VEHICLES,

by Harvison Hunt. Jan 64, 22p.
AFSWC TDR63 67 Unclassified report

Descriptors: (*Rockets, Wind), (*Guided missiles (Surface to surface), Wind), Flight paths, Deflection, Configuration, Programming (Computers), Spin-stabilized ammunition, Ballistics, Fourier analysis, Fins, Analysis, High altitude, Guided missile trajectories, Corrections.

A method is presented for calculating the wind compensation solution for unguided missiles. A six-degree-of-freedom program is used as a basis for determining the required launch azimuth and elevation corrections. The results are then incorporated into a more rapid, but as accurate, solution adapted for use at the National Missile Ranges. The presented wind compensation method was used on the SLV-1B vehicle and Program 661A vehicles with excellent results. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-426 740 Div. 13, 33
OTS price $11.50

Netherlands Ship Model Basin.
FEASIBILITY STUDY OF A MULTI-PURPOSE HARBOUR UNIT.
Final rept.
July 63, 129p.
Contract N62558 2986
Unclassified report

Descriptors: (*Piers, Mobile), (*Floating docks, Mobile), Amphibious operations, Break waters, Floating bodies, Damping, Structures, Water waves, Containers, Fastenings, Piers, Ocean waves, Models (Simulations), Piezoelectric transducers, Instrumentation, Height finding, Model tests, Load distribution, Pressure, Handling, Design, Configuration, Floats.

Investigations into the flexibility of divergent systems for providing a Multi-Purpose Harbour Unit led to the conclusion that caisson-type units are probably most adequate for breakwater purposes and can, moreover, effectively be adapted for the alternative formation of piers. Apart from tests for determining the attenuation performance, liability to scour, and specific problems with respect to transport and handling, considerable attention was paid to the forces exerted by incident waves and the attendant response of the structure. An amplification of the customary criteria wave conditions with experiments to establish the effect of dynamic and quasi-static forces inherent to irregular wind generated waves necessitated a statistical processing of the records. The various results have been incorporated in the preliminary design of three different caisson units, of which the ''twin pontoon'' most likely offers the best prospects for practical application. (Author)

14. MATERIALS (NON-METALLIC)

AD-426 560 Div. 14, 17, 30, 9
OTS price $2.60

North Carolina State Coll., Raleigh.
LUBRICATION BEHAVIOR OF LIQUID METALS.
Annual summary rept., 1 Oct 61-31 Dec 62,
by P. H. McDonald and J. A. Edwards. Jan 63, 31p.
Contracts AF33 657 7635 and AF33 616 5885, Proj. 7342, Task 734204
ASD TDR63 134 Unclassified report

Descriptors: (*Liquid metals, Lubricants), (*Lubricants, Liquid metals), Bearings, Journal bearings, Theory, Hydrodynamics, Sodium alloys, Potassium alloys, Friction, Loading (Mechanics), High temperature research, Test equipment, Lubrication.

This research program was conducted to determine the lubrication behavior of liquid metals. The objectives of the program were to study hydrodynamic bearing theory to determine the frictional characteristics, eccentricity, and load-carrying capacity of full journal bearings and to compare experimental data with analytical data and attempt to explain any discrepancies. Preliminary studies were conducted using Stoddard solvent as the lubricant. These studies suggest several modifications of the experimental apparatus and indicated some precautionary measures that must be taken to obtain reliable data. (Author)

AD-426 565 Div. 14, 25
OTS price $3.60

Virginia Inst. for Scientific Research, Richmond.
A STUDY OF THE GROWTH AND PERFECTION OF SINGLE CRYSTALS OF THE RARE EARTHS AND ALKALI METALS.
Rept. for 1 Feb 61-31 Jan 63,
by James F. Kirn. 31 Jan 63, 23p.
Grant AF AFOSR61 41
AFOSR J1355 Unclassified report

Descriptors: (*Rare earths, Crystal growth), (*Alkali metals, Single crystals), Sodium, Potassium, Etched crystals, Nickel, Microscopy, Electrolytic polishing, Furnaces, Temperature, Surface, Crystals, Melting, Hydrocarbons, Chlorine compounds.

Single crystals of sodium and potassium were prepared by the Czochralski techniques in glass vessels under vacuum or an argon atmosphere. Methods of cutting, orienting, and studying the samples microscopically were developed. Chlorinated hydrocarbons show considerable promise as etchants. An arc-image furnace was constructed and single crystals of nickel were prepared. The major problem in the use of this furnace is temperature control. (Author)

AD-426 664 Div. 14
OTS price $9.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
BEHAVIOR OF PLASTICS UNDER IMPULSIVE STRESS,
by D. G. Flom, F. A. Lucy, and H. W. Semon.
Dec 63, 109p.
Contract AF29 601 4418, Proj. 5776, Task 58043
RTD TDR63 3080 Unclassified report

Descriptors: (*Epoxy plastics, Fracture (Mechanics), (*Fracture (Mechanics), Plastics), (*Impact shock, Plastics), Plastics, Mechanical properties, Compressive properties, Elasticity, X-ray diffraction analysis, Electron microscopy, Transducers, Stresses, Microscopy, Equations of state, Oscillographs, Light transmission, High speed photography, Test equipment, Test methods.

Under brief impulsive loading by flying plates, fractures formed in rubbery resins differ from

those formed in glassy resins. The latter usually crack by spreading of well-defined ridged disks roughly parallel to the wave front. Fractures in rubbery resins may be bursts of feathery cracks, ridged cones, or nearly featureless disks. The fracture orientation usually departs widely from that of the wave front. The fracture threshold for a glassy resin was found to lie between 0.4 and 0.6 kb; whereas the threshold for a chemically similar rubbery resin lay between 1.0 and 1.4 kb. Changes of pulse height and pulse shape with travel were found to be rapid within the first pulse length but quite slow thereafter. Pulse steepness was shown to be lost faster in rubbery than in glassy material. The observations were made with quartz transducers. Electron and optical micrography of fracture surfaces, x-ray diffraction, and measurements of Poisson's ratio and compressibility under dynamic conditions all contributed to an explanation of differences in strength and type of fractures. (Author)

AD-426 665 Div. 14, 25
OTS price $1.50

Union Carbide Consumer Products Co., Parma, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXI. CARBON ARC IMAGE FURNACE STUDIES OF GRAPHITE,
by M. R. Null and W. W. Lozier. Nov 63, 49p.
Contract AF33 616 6915, Proj. 7350; Tasks 735002; 738102
WADD TR61 72. Vol. 21
Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Carbon, Reflection), (*Graphite, Reflection), Emissivity, High-temperature research, Pyrolytic graphite, Heating, Cooling, Polarization, Laboratory furnaces, Surface temperature, Physical properties, Thermal conductivity, Surface properties, Images, Sublimation, Oxidation, Mathematical analysis.

Measurements obtained using a carbon arc image furnace indicate that the spectral reflectance and emissivity of carbon and graphite samples in the visible region of the spectrum are strongly dependent on surface finish, but are independent of temperature to at least 3000 K, regardless of surface finish. Descrepancies with other measurements of emissivity are indicated to be caused by errors in the measurement of surface temperature, due to thermal gradients. Information has been obtained with the carbon arc image furnace indicating that the thermal conductivity of surface material depends strongly on surface finish and is smaller than the conductivity of substrate material. (Author)

AD-426 713 Div. 14, 26
OTS price $1.10

Lexington Labs., Inc., Cambridge, Mass.
FEASIBILITY OF FORMING REFRACTORY FIBERS BY A CONTINUOUS PROCESS.
Quarterly progress rept. no. 2, 25 May-25 Aug 63,
by William B. Campbell, 25 Aug 63, 6p.
Contract DA19 020AMC0068X, Proj. 59332008
AMRA CR63 03 2 Unclassified report

Descriptors: (*Ceramic fibers, Material forming), (*Aluminum compounds, Oxides), Feasibility studies, Vapors, Condensation reactions, Chlorides, Crystal growth, Nucleation, Pressure, High temperature research, Oxidation, Reduction (Chemistry), Recrystallization, Temperature, Vapor plating.

Methods for continuous formation of refractory fibers, or whiskers, by vapor phase growth are under investigation. The vapor phase processes are: (1) aluminum halide oxidation and (2) aluminum oxide reduction and recrystallization. Preliminary experimentation with the halide system at temperatures around 1200 C indicates that in order to obtain continuous fiber production, it is essential to (1) control the supersaturation, (2) control the temperature, and (3) provide suitable nuclei for crystal growth. (Author)

AD-426 732 Div. 14, 17
OTS price $6.60

Battelle Memorial Inst., Columbus, Ohio.
DEFENSE METALS INFORMATION CENTER SELECTED ACCESSIONS,
comp. by Mary F. Banks. Dec 63, 47p.
Contract AF33 616 7747, Proj. 2 8 8975
Unclassified report

Descriptors: (*Bibliographies, Materials), (*Materials, Bibliographies), Alloys, Metals, Ceramic materials, Composite materials, Coatings, Mechanical properties, Physical properties, Test methods, Refractory materials, Material forming, Abstracts.

AD-426 781 Div. 14, 25
OTS price $1.75

Union Carbide Consumer Products Co., Parma, Ohio.
RESEARCH AND DEVELOPMENT ON ADVANCED GRAPHITE MATERIALS. VOLUME XXXIX. DIAMAGNETIC SUSCEPTIBILITY OF GRAPHITE BY THE FARADAY METHOD,
by D. E. Soule and C. W. Nezbeda. Nov 63, 49p.
Contract AF33 616 6915, Proj. 7350, Tasks 735002 and 738102
WADD TR61 71, vol. 39 Unclassified report

Descriptors: (*Graphite, Magnetic properties), (*Magnetic properties, Graphite), Crystals, Single crystals, Measurement, Pyrolytic graphite, Heat treatment, Anisotropy, Transport properties, Impurities, Boron, Hall effect, Symmetric (Crystallography), Ferromagnetism, Permeability (Magnetic).

The diamagnetic susceptibility of several types of graphite, both single and polycrystalline, was investigated at room temperature by the Faraday method. This method measures the entire sample; it can be used to obtain the three components for a trace; and it can account for ferromagnetic impurities. The susceptibility trace, representing the contribution of the truly graphitic portion of a sample, ranges from -22.8 times 10 to the - 6th power emu/gm for single crystals down to -19.1 times 10 to the - 6th power emu/gm for grade ZTA graphite. Direct orientation measurements showed that both single crystals and polycrystals display a true cosine-squared dependence, modified in amplitude by the degree of preferred crystallite orientation. These results are justified theoretically. (Author)

AD-426 815 Div. 14
OTS price $9.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
COLLECTION OF SCIENTIFIC WORKS. CHEMISTRY AND CHEMICAL TECHNOLOGY OF SILICATE MATERIALS (SELECTED ARTICLES),
113p.
FTD TT63 688 Unclassified report

Trans. from Sbornik Nauchnykh Trudov. Khimiya i Khimicheskaya Tekhnologiya Silikatnykh Materialov, (Russian), Redaktsionno-Izdatelskiy Otdel BPI imeni I. V. Stalina, Nr. 82, pp. 86-165, Minsk - 1960.

Descripors: (*Ceramic materials, Silicates), (*Silicates, Scientific research), Clay, Clay minerals, Glass, Crystallization, Colors, Optical properties, Synthesis (Chemistry), Heat treatment, Material forming, Mechanical properties, Physical properties, Test equipment, Microphotometers, Brick, Refractory materials.

AD-426 838 Div. 14, 25
OTS price $5.60

Rohm and Haas Co., Huntsville, Ala.
MATHEMATICAL STUDIES OF COMPOSITE MATERIALS.
Final rept. 15 Oct 62-31 May 63,
by Howard B. Wilson, Jr. 17 Dec 63, 48p.
Rept. no. S42
Contract DA01 021ORD11878
Unclassified report

Descriptors: (*Composite materials, Stresses), (*Stresses, Mathematical analysis), Theory, Bibliographies, Elasticity, Reviews, Integral equations, Special functions (Mathematical), Series, Fourier analysis, Mathematical models.

Several types of idealized composite material systems are discussed. A bibliography pertaining to the analysis of stresses in such systems under the assumption of linear elasticity is given. Solutions by complex variable methods are presented for three mixed boundary-value problems concerning an infinite plane with a circular or elliptic hole containing an insert in partial contact with the hole. (Author)

AD-426 892 Div. 14, 17
OTS price $7.60

Snell, Foster D., Inc., New York.
DEVELOPMENT OF ULTRA-THIN FILM PRESERVATIVE COMPOUNDS PREPARED UNDER NAVY, BUREAU OF NAVAL WEAPONS.
Final rept., 1 Nov 62-31 Oct 63.
31 Oct 63, 65p.
Contracts NOw61 0855 and NOw63 0293
Unclassified report

Descriptors: (*Corrosion inhibition, Plastic coatings), (*Plastic coatings, Metals), (*Corrosion, Plastic coatings), Protective treatments, Adhesion, Additives, Antioxidants, Surface active substances, Humidity cabinets, Environmental tests, Acrylic resins, Cellulosic plastics, Epoxy plastics, Thermoplastics, Metals, Light transmission, Preservation, Materials.

Compositions developed under this project were evaluated for effectiveness in preventing corrosion by exposing metal panels dipped in these compositions in the controlled cyclic condensation humidity cabinet. Resins or polymers with varying amounts and types of anticorrosion, antioxidant, and surfactant additives constituted the film-forming portions of these compositions. Several of the compositions were applied to metal panels which were exposed in a louvered shed for periods of one to six and one-half months. The most successful compositions included several based on Piccopale 100, Piccopale 110, Epon 1007, and Half-Second Butyrate as the major film ingredient. A composition based on Piccopale 110 is preferred because of its superior adhesion while maintaining approximately equivalent rust-preventive ability compared with those based on Epon 1007 and Half-Second Butyrate. (Author)

15. MATHEMATICS

AD-426 500 Div. 15
OTS price $8.60

Case Inst. of Tech., Cleveland, Ohio.
TABLES OF THE CUMULATIVE NON-CENTRAL CHI-SQUARE DISTRIBUTION,
by G. E. Haynam, Z. Govindarajulu and F. C. Leone. Nov 62, 89p. Pub. no. 104
Grant AF AFOSR62 72
AFOSR 4620 Unclassified report

Descriptors: (*Statistical distributions, Tables (Mathematics)), Errors.

Three extensive tables related to the cumulative non-central chi-square distribution are presented, namely: (1) the power of the non-central chi-square distribution, (2) the non-centrality parameter of the non-central chi-square distribution, and (3) the degrees of freedom of the non-central chi-square distribution. Also, a short discussion of the errors involved in the computations is presented. (Author)

AD-426 585 Div. 15
OTS price $1.60

RAND Corp., Santa Monica, Calif.
NUMERICAL SOLUTION OF FUNCTIONAL EQUATIONS BY MEANS OF LAPLACE TRANSFORM-II: DIFFERENTIAL-DIFFERENCE EQUATIONS,
by R. E. Bellman, R. E. Kalaba and J. Lockett.
Dec 63, 9p. Rept. no. RM3952NIH
Grant GM09608 02
Unclassified report

Descriptors: (*Numerical analysis, Difference equation), Differential equations, Integral transforms, Networks, Circuits, Biology, Operations research.

Differential-difference equations are solved using a numerical procedure for inverting Laplace transforms. The study may be of interest to control and circuit engineers and to numerical analysts. These methods are also useful in treating wide classes of equations arising in biology, chemistry, and operational research. (Author)

AD-426 656 Div. 15
OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
A NOTE ON REGULAR PERTURBATION THEORIES,
by F. E. Bisshopp. Nov 63, 27p. Rept. no. 84;
D1 82 0316
Unclassified report

Also available from the author.

Descriptors: (*Perturbation theory, Matrix algebra), Mathematical analysis.

AD-426 677 Div. 15, 25
OTS price $6.60

Stanford U., Calif.
DEVELOPMENT AND EVALUATION OF PROCEDURES FOR QUANTIZING MULTIVARIATE DISTRIBUTIONS,
by Paul Zador. 10 Dec 63, 64p. Rept. no. TR92
Contract Nonr22552, Proj. NR342022
Unclassified report

Descriptors: (*Statistical analysis, Communication theory), (*Communication theory, Statistical analysis), Distribution, Probability, Statistical tests, Stochastic processes, Special functions, Numerical analysis, Numerical methods and procedures, Statistical functions.

The approximation generated by a specific but arbitrary partition and a specific but arbitrary set of representation points is examined. A statistical measure of error is investigated. The size of the error is measured by some moment of the random variable. Such a measure involves both the geometrical properties of the partitioning in the k-dimensional space, and the probability density. The approximation of the random variable is accomplished by selecting the representation points at random, independently of one another, and according to some given density function and then constructing the partition. In Chapter 2 we shall examine the behavior of the lower bound of the average normalized error for fixed variables is examined. The behavior of the minimum error when there is a large number of representation points is demonstrated. This extension takes into account the entropy rate of the discrete quantizing sequence. (Author)

AD-426 719 Div. 15, 16
OTS price $1.60

RAND Corp., Santa Monica, Calif.
NUMERICAL SOLUTION OF FUNCTIONAL EQUATIONS BY MEANS OF LAPLACE TRANSFORM-I: RENEWAL EQUATION,
by R. E. Bellman, R. E. Kalaba and J. Lockett.
Dec 63, 14p. RM3948NIH
Grant GM09608 02

Unclassified report

Descriptors: (*Equations, Numerical analysis), Integral transforms, Statistical processes, Programming (Computers), Difference equations, Differential equations, Dynamic programming, Linear systems, Cancer, Pharmocology, Biology, Operations research.

Techniques for the numerical inversion of Laplace transforms are presented. These are methods to handle convolution integrals computationally for studies of cancer chemotherapy. The techniques are also useful in treating classes of equations arising in biology, chemistry, and operations research.

AD-426 822 Div. 15, 25
OTS price $9.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
THE TWO VARIABLE EXPANSION PROCEDURE FOR THE APPROXIMATE SOLUTION OF CERTAIN NON-LINEAR DIFFERENTIAL EQUATIONS,
by J. Kevorkian. 3 Dec 62, 114p. Rept. no. SM42620
Grant AF AFOSR62 256

Unclassified report

Presented at the 1962 Summer Institute in Dynamical Astronomy, Yale University, New Haven, Conn.

Descriptors: (*Nonlinear differential equations, Numerical analysis), Differential equations, Motion, Perturbation theory, Celestial mechanics, Damping, Oscillation, Magnetic fields, Charged particles, Special functions, Satellites (Artificial), Orbital trajectories, N-body problem, Mechanics.

A method is presented for deriving the asymptotic representation valid for large times for the motion of a particle under the influence of a predominantly linear restoring force and small nonlinear perturbations. It is shown that such an asymptotic representation must be a function of two time variables, in order to depict the behavior of the solution. The basic ideas are explained by the liberal use of simple examples, and the method is also applied to two idealized problems in celestial mechanics. (Author)

AD-426 831 Div. 15
OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
TABLES OF BOUNDS FOR DISTRIBUTIONS WITH MONOTONE HAZARD RATE,
by Richard E. Barlow and Albert W. Marshall.
Dec 63, 54p. Document no. D1 82 0249; Mathematical note no. 294

Unclassified report

Also available from the author.

Descriptors: (*Tables, Statistical functions), Statistical analysis, Equations, Probability, Series, Stochastic processes, Sampling, Reliability, Inequalities.

A number of bounds for distributions with monotone hazard rate are presented in a form convenient for applications. These bounds, together with their proofs and various generalizations have been obtained by Barlow and Marshall (1963). However, many of them can be characterized only through solutions of transcendental equations, and machine calculation has been necessary to make them accessible. A listing of the results is given and those without explicit forms are tabulated. Various related bounds are listed which are of interest for purposes of comparison, and for use when the hypothesis of monotone hazard rate is not satisfied. Applications of the bounds are discussed together with some numerical examples. (Author)

AD-426 873 Div. 15, 30
OTS price $1.60

Operations Research Center, U. of Calif., Berkeley.
A GRADIENT INEQUALITY FOR NON-DIFFERENTIABLE FUNCTIONS,
by E. Eisenberg. Sep 63, 14p. Rept. no. ORC63 25
Contract Nonr222 83

Unclassified report

Descriptors: (*Programming (Computers), Theory), Inequalities, Functions), Mathematical analysis, Game theory, Economics, Vector analysis, Matrix algebra.

AD-426 876 Div. 15
OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
AN APPROACH TO NONLINEAR NETWORKS,
by Bernard Friedman. Sep 63, 48p. Rept. no. D1 82 0307; MN325

Unclassified report

Descriptors: (*Nonlinear systems, Stability), (*Algebras), Vector analysis, Algebraic topology, Stability, Electrical networks, Determinants, Geometry, Stabilization, Differential equations, Networks.

Several mathematical topics which seem to be relevant to the treatment of nonlinear networks are

discussed. The main topics deal with stability theorems recently obtained by Brayton and Moser. Some exterior or Grassman algebra, some algebraic topology, some theorems about electrical networks, and a few remarks about Liapunov stability are presented. The approach has been kept to a very elementary and a very intuitive level. (Author)

AD-426 894 Div. 15
OTS price $1.60

Naval Research Lab., Washington, D. C.
THE MOMENTS OF A SAMPLED BINOMIALLY DISTRIBUTED VARIABLE.
Interim rept.,
by H. M. Suski. 2 Dec 63, 11p.
Proj. RF001 10 41 4150
NRL 6008 Unclassified report

Descriptors: (*Statistical functions, Sampling), Statistical distributions, Probability, Moments, Binomials.

A statistical variable consisting of two components is considered. One component has as its density function the universe of the variable; the other component, the distribution of the mean. The use of a two-component variable leads to the introduction of two orders of finite sampling. For the case of a binomially distributed variable, the theory of moment-generating functions is used to derive equations for the first four moments about an arbitrary origin. The second, third, and fourth moments about the mean are obtained, as well as the moment numbers Beta 1, Beta 2, Gamma 1, and Gamma 2. The detailed steps of the derivations, including underlying assumptions, are given. (Author)

16. MEDICAL SCIENCES

AD-426 583 Div. 16
OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
POLAR TRANSPORT OF CALCIUM IN THE PRIMARY ROOT OF ZEA MAYS,
by Evan C. Evans, III. 7 Oct 63, 13p.
BuShips Proj. SR011 01 01, Task 0401
NRDL TR678 Unclassified report

Descriptors: (*Calcium, Biochemistry), (*Metabolism, Calcium), (*Corn, Metabolism), Absorption (Biological), Tracer studies, Plants (Botany), Physiology, Fission products, Mineral products.

Transport of calcium in 20-mm root segments is basipetal and requires metabolic maintenance. Such transport reaches a maximum rate at approximately 12 hours and is still pronounced at 50 hours. Acropetal movement is slight, nonmetabolic, and essentially constant. Amounts transported are linearly dependent on the absorbing area exposed to tracer solution. (Author)

AD-426 661 Div. 16, 23
OTS price $2.00

Lockheed Aircraft Corp., Marietta, Ga.
HUMAN GROUP PERFORMANCE DURING CONFINEMENT,
by Earl A. Alluisi, W. Dean Chiles, Thomas J. Hall and Glenn R. Hawkes. Nov 63, 72p.
Contract AF33 616 7607, Proj. 1710, Task 171002
AMRL TDR63 87 Unclassified report

Report on Training Personnel and Psychological Stress Aspects of Bioastronautics.

Descriptors: (*Group dynamics, Confinement), (*Space flight, Personnel), Performance tests, Military personnel, Motivation, Effectiveness.

Six Air Force Academy cadets were confined for 15 days in a simulated advanced-system crew compartment while following a schedule of 4-hours on duty and 2-hours off, and two 5-man crews of USAF pilots were confined for 30 days while alternating shifts on a schedule of 4-hours on duty and 4-hours off. While on duty the operators were tested with a battery of 6 performance tasks, 2 of which required interactions among crewmembers in the form of exchanges of information, cooperation, and temporal coordination. In addition, the data of the present studies were compared with those of two previous 15-day tests of two crews who worked the 4-2 schedule while being tested with a battery of 5 individual-performance tasks. The data suggest that with proper control of selection and motivational factors, crews can work effectively for periods of at least 2 weeks and probably longer using a schedule of 4-hours on duty and 2-hours off. Crews can work even more effectively for periods of at least a month and quite probably for 2 or 3 months using a schedule of 4-hours on duty and 4-hours off, and with this schedule less demanding controls of selection and motivational factors are required. (Author)

AD-426 684 Div. 16, 25
OTS price $1.60

6595th Aerospace Test Wing, Vandenberg Air Force Base, Calif.
A LIGHTING GUIDE FOR BIO-ENVIRONMENTAL ENGINEERS,
by Donald G. Silva. 25 Sep 63, 19p.
Unclassified report

Descriptors: (*Lighting equipment, Installation), (*Light, Physics), Instruction manuals, Illumination, Design, Electromagnetic waves, Distribution, Reflection, Brightness, Temperature, Fatigue (Mechanics), Calibration.

The purpose of this report is a guide for Bio-Environmental Engineers to evaluate lighting installations. It is limited in scope and does not cover all aspects of illumination. It is intended to furnish the Bio-Environmental Engineers with a working knowledge of lighting, its design and effects on personnel. (Author)

AD-426 745 Div. 16
OTS price $1.60

Maryland U., College Park.
TICKS. VOL. II, NO. 12.
1959, 16p.
Contract DA49 193MD2238
Unclassified report

Descriptors: (*Ticks, Bibliographies), (*Mites, Bibliographies), (*Insects, Bibliographies), (*Diptera, Bibliographies), (*Medical research, Bibliographies), Bacteria, Diseases, Protozoa, Viruses, Medicine, Arthropods, Disease vectors, Lice, Parasites, Public health, Ecology, Economics, Epidemiology, Infections.

AD-426 746 Div. 16
OTS price $1.60

Maryland U., College Park.
TICKS.
1963, 15p.
Contract DA49 193MD2238
Unclassified report

Descriptors: (*Bibliographies, Arthropods), (*Arthropods, Bibliographies), Diseases, Disease vectors, Ticks, Mites, Diptera, Siphonaptera, Lice, Parasites, Viruses, Rickettsiales, Spirochaetales, Protozoa, Medical research, Public health.

AD-426 747 Div. 16
OTS price $2.60

Maryland U., College Park.
TICKS. VOL. II, NO. 11.
1963, 30p.
Contract DA49 193MD2238
Unclassified report

Descriptors: (*Bibliographies, Arthropods), (*Arthropods, Bibliographies), Diseases, Disease vectors, Ticks, Mites, Diptera, Siphonaptera, Lice, Parasites, Virus, Ricketts-iales, Spirochaetales, Photoza, Medical research, Public health.

AD-426 748 Div. 16
OTS price $1.10

Maryland U., College Park.
CURRENT REFERENCES IN MEDICAL ENTOMOLOGY FROM RUSSIAN, CENTRAL AND EASTERN EUROPEAN, AND CHINESE LITERATURE. VOLUME III,
ed. by George Anastos. 1964, 8p.
Contract DA49 193MD2238
Unclassified report

Descriptors: (*Bibliographies, Arthropods), (*Arthropods, Bibliographies), Diseases, Disease vectors, Ticks, Mites, Diptera, Siphonaptera, Lice, Parasites, Viruses, Rickettsiales, Spirochaetales, Protozoa, Medical research, Public health.

Division 16 - MEDICAL SCIENCES

AD-426 816 Div. 16, 28
OTS price $4.00

RCA Service Co., Inc., Camden, N. J.
TECHNIQUES OF PHYSIOLOGICAL MONITORING. VOLUME II. COMPONENTS,
by Richard Alnutt, Philip T. Weinberg, and ed. by Robert E. Barbiere. Nov 63, 256p.
Contract AF33 657 9252, Proj. 7222, Task 722203
AMRL TDR62 98, vol. 2 Unclassified report

Descriptors: (*Monitors, Physiology), (*Space flight, Monitors), Data processing system, Theory, Electronic equipment, Transducers, Electrodes, Amplifiers, Recording systems, Oscilloscopes, Amplifiers, Multiplex, Modulation, Digital computers, Analog computers, Display systems, Magnetic tape, Analysis, Data, Magnetic cores, Punched cards, Freqency modulation, Frequency converters, Telemetering transmitters, Pulse generators, Differentiating circuits, Galvanic skin response, Integrated circuits, Trigger circuits, Cathode ray tube screens.

This volume surveys the components used in physiological monitoring systems, primarily those suitable for aerospace applications. Discussion includes performance characteristics and capabilities, plus some background theory, on basic components such as electrodes and transducers, signal modifiers, and graphic recording and display devices; The use of magnetic tape recorders in instrumentation is described. Wire and radio transmission equipment is discussed, plus various schemes of modulation and multiplexing. The capabilities of digital and analog computers and other data processing equipment are described, and the analysis of physiological data with such equipment is briefly discussed. (Author)

AD-426 885 Div. 16, 4
OTS price $2.25

Polytechnic Inst. of Brooklyn, N. Y.
MECHANISM OF ENZYME ACTION.
Terminal rept., 1 Oct 62-30 Sep 63,
by C. G. Overberger, Thomas St. Pierre, R. Sitaramaiah, Joseph Lee and Samuel Yaroslavsky.
28 Dec 63, 66p.
Contract DA18 108amc63a
Unclassified report

Descriptors: (*Enzymes, Biochemistry), (*Enzymes, Reaction kinetics), (*Biochemistry, Enzymes), N-heterocylic compounds, Polyester plastics, Vinyl plastics, Copolymerization, Polymers, pH, Volumetric analysis, Acrylic resins.

The carboxylic groups and SH groups play important roles in hydrolytic plant-enzymes like papain and ficin. A cooperative effect of imidazole groups and mercapto or carboxylic groups are important in the action of several glycolytic enzymes. In addition, electrostatic attraction to the carboxylate anion in cholinesterase may help the catalytic hydrolysis of the imidazole groups on the enzyme from a 'neighboring group' position. The synthetics of homopolymers, copolymers and appropriate substrates and the kinetic studies performed so far were done in order to attain further insight into the mechanism of action of the aforementioned hydrolytic enzymes. (Author)

AD-426 888 Div. 16
OTS price $4.60

Saltpetriere Hospital, Paris (France).
RESEARCH ON IMPROVED TECHNIQUES OF RECORDING AND DISPLAY OF THE ELECTRICAL ACTIVITY OF THE BRAIN.
Final technical rept.,
by Antoine Remond. 15 Oct 63, 46p.
Contract AF61 052 203
AFOSR J1455 Unclassified report

Descriptors: (*Brain, Electrical properties), Recording systems, Display systems, Neurology, Physiology, Scientific research, Light, Stimulation, Electroencephalography.

An attempt to make better use of spatial relationships of cerebral electrical phenomena has been made. This attempt led to the development of methods emphasising the qualities and properties of such relationships by presentation of the phenomena in more complete forms. The study of such methods has been carried out by the construction of a series of devices and apparata hich integrated progressively their various elements. This resulted in the use of a system distinguishing three different parts; a unit for acquisition, a unit for conversion and a unit for the processing of data. This enabled a more practical use of the electroencephalographic information by improvement in the resolutions of time, space and amplitude, by the automatic correction of systematic errors, by the use of a number of processing programmes and that of a series of specific forms of presentation of results which were to demonstrate more clearly the various properties of this studied material. The form of presentation, tables, chronograms, topograms, isochronograms, spatio-temporal maps, etc. and their content, transformation of potential, gradient, current, the different integrations and averages, direct or reciprocal correlations, spectrums, etc., all comprise many aspects and approaches by which it is possible to examine the electrical phenomena produced by cerebral activity. Some fragmentary examples of spontaneous activity are given, as well as the average response to intermittent photic stimulation to illustrate this description. (Author)

AD-426 890 Div. 16
OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
ACID DEOXYRIBONUCLEASE (DNase II) IN RAT LIVER CELL NUCLEI ISOLATED IN THE PRESENCE OF Ca++,
by K. F. Swingle and L. J. Cole. 1 Nov 63, 28p.
Task MR005 08 1200
NRDL TR688 Unclassified report

Descriptors: (*Enzymes, Physiology), (*Physiology, Enzymes), Radiation effects, Cells (Biology), Liver, Desoxyribonucleic acids, Rats, Nuclei (Biology), Biological assay, Calcium.

The failure of many investigators to find more than traces of deoxyribonuclease activity in the nuclei of cells has led to difficulties in attempting to ascribe a physiological role to this enzyme in living cells. Reinvestigation in this laboratory disclosed that nuclear fractions centrifugally separated from rat liver homogenates in isotonic sucrose or in water, containing in each case 1.8 x 10 to the -3 power M CaCl(2) and washed repeatedly in the same media, retained a considerable amount of acid DNase activity. Similarly prepared nuclear fractions using calcium-free media lost nearly all of their DNase activity. This retention of activity in the presence of calcium was shown to be neither co-sedimentation of unbroken cells or of lysosomes with the nuclear fraction nor precipitation of soluble DNase in the presence of calcium. The nuclear-bound enzyme was active under conditions which were shown not to remove it from the nuclei. (Author)

AD-426 893 Div. 16, 26
OTS price $2.00

Linde Co., Div. of Union Carbide Corp., Tonawanda, N. Y.
RESEARCH ON PROCEDURES FOR THE LOW-TEMPERATURE PRESERVATION OF BLOOD. XVI. PROCESS OPTIMIZATION.
Progress rept.,
by A. P. Rinfret. 13 Dec 63, 63p.
Contract Nonr3003 00
Unclassified report

Descriptors: (*Blood, Processing), (*Blood, Preservation), Erythrcytes, Additives, Anticoagulants, Feasibility studies, Medical equipment, Containers, Freezing, Heat transfer, Coatings, Polyethylene plastics, Low-temperature research, Cells (Biology), Viability, Biochemistry.

In process I plasma is separated from red cells by conventional centrifugation and the cells resuspended in an additive solution containing polyvinylpyrrolidone (PVP). It has been found that, with a small quantity of albumin in the additive, PVP concentrations reqquired for red blood cell protection can be decreased and the in-vitro recoveries significantly improved. PVP alone is less efficient in providing protection against freeze-thaw damage in this type of preparation. In Process III blood is collected directly into an additive-anticoagulant mixture or collected into anticoagulant and subsequently mixed with the protective additive. This is the system of choice only when prefeeze handling is to be kept at a minimum. Recoveries of 97% can be attained with this process using Plasdone-C (PVP with an average M.W. of 40,000). Lower molecular weight PVPs have provided equivalent protection of cells from freeze-thaw hemolysis, however, these cells are less stable osmotically. Preliminary studies of the prefreeze removal of precipitate from the interaction of PVP and plasma in Process III indicate that red cell recovery is not affected by the procedures involved. (Author)

AD-426 899 Div. 16
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE DAILY LIFE OF THE STAR MAN,
by V. Gubarev. 11 Dec 63, 8p.
FTD TT63 1072 Unclassified report

Trans. from Komsomol'skaya Pravda, Moscow, p. 4, June 16, 1963.

Descriptors: (*Astronauts, Reports), (*Manned spacecraft, Maintenance), Food dispensing, Wastes (Sanitary engineering), Taste, Water supplies, Exercise.

AD-426 900 Div. 16
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PHYSIOLOGICAL REACTIONS OF THE HUMAN ORGANISM DURING THE ACTION OF ACCELERATIONS, MAXIMUM IN TIME AND INTENSITY, DIRECTED ALONG THE SPINE-BREAST AXIS,
by A. A. Barer and G. A. Golov. 10 Dec 63, 11p.
FTD TT63 1095 Unclassified report

Trans. from Byulleten' Eksperimental'noy Biologii i Meditsiny, No. 7, pp. 24-29, 1963.

Descriptors: (*Acceleration tolerance, Man), (*Physiology, Acceleration tolerance), Respiration, Reaction (Psychology), Cardiovascular system, Visual acuity, Electroencephalography, Aviation medicine.

AD-426 934 Div. 16
OTS price $2.60

RAND Corp., Santa Monica, Calif.
A NEURAL NET FOR ADAPTIVE BEHAVIOR,
by Stanley H. Block. Dec 63, 21p. RM3868PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Behavior, Models (Simulations)), Nets, Nerve cells, Bionics, Theory, Stability, Learning.

A neural net which demonstrates the concepts of adaptive biological processes as described by Ashby is presented. The basic assumption is that there exist certain cells whose firings represent a state of warning and that, to survive, the organism must keep the activity of these cells within certain limits. This net consists of four groups of cells which represent the organism and a single group of input cells which represent the environment. When the organism is presented with environmental conditions, it will demonstrate adaptive behavior, i.e., it will attempt to minimize the length of time needed to counteract the adverse effect of the environmental conditions upon the organism. (Author)

AD-426 967 Div. 16
OTS price $4.00

Buffalo U. School of Medicine, N. Y.
STUDIES IN PULMONARY PHYSIOLOGY MECHANICS, CHEMISTRY, AND CIRCULATION OF THE LUNG. VOLUME I,
by Hermann Rahn and Leon E. Farhi. Oct 63, 273p.
Contracts AF33 616 6823 and AF33 657 10082,
Proj. 7164, Task 716404
AMRL TDR63 103, vol. 1 Unclassified report

Report on Biomedical Criteria for Aerospace Flight.

Descriptors: (*Respiratory system, Reviews), Lungs, Physiology, Chemistry, Biochemistry, Cardiovascular system, Diffusion, Gases, Blood, Respiration, Pressure breathing, Ventilation.

The scientific papers compiled in this report on pulmonary physiology are divided into the following divisions: Mechanics of Respiration and Pressure Breathing, Gas Exchange and Breath Holding, Blood Gases, Ventilation-Perfusion Relationships, Non-Pulmonary Gas Diffusion, Gas Stores, and Effects of Gaseous Environments. A summary of each of these divisions is found in the section entitled, ''A Brief Summary of Investigations.'' (Author)

AD-426 974 Div. 16, 20
OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
GAMMA RADIATION EFFECTS ON ISOPRENOIDS. II. 2,6-DIMETHYLOCTANE AND 2,6-DIMETHYLOCTADIENE-2,6,
by W. E. Shelberg. 20 Sep 63, 26p.
Proj. SR007 1101, Task 0556
NRDL TR691 Unclassified report

Descriptors: (*Organic compounds, Decomposition), (*Rubber, Radiation effects), (*Radiation chemistry, Rubber), Diffusion, Radiation damage, Polymers, Chemical properties.

The radiolytic decomposition of 2,6-dimethyloctadiene-2,6 and 2,6-dimethyloctane, respectively models for rubber and hydro-rubber, was investigated. Yields of hydrogen gas and hydrocarbons through C5 were determined at low conversions. For both models, hydrogen gas was attributed to abstractions by hot and lesser energetic hydrogen atoms and to hydrogen molecule detachments. Nineteen hydrocarbon products were found for the diene and twenty for the parafin. Yields from the diene are generally smaller than those from the parafin. The formation of hydrocarbon products from the diene is interpreted by means of radical reactions involving little or no diffusion. The formation of hydrocarbon products from the paraffin is interpreted by means of radical reactions involving caging as well as free diffusion. (Author)

AD-426 981 Div. 16
OTS price $9.10

Fordham U., New York.
SELECTED ABSTRACTS FROM SOVIET BIOMEDICAL JOURNALS. SERIES II. NO. 2,
by Robert Pollitzer. Sep 63, 1v.
Contract DA18 108 405cm1867A
Unclassified report

Descriptors: (*Abstracts, Medicine), (*Medicine, Abstracts), Biology, Diseases, Brucella, Vibrio, Small pox virus, Rickettsia, Bacillus anthracis, Pasteurella, Encephalitis virus, Microorganism.

AD-426 982 Div. 16
OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
LOW TEMPERATURE PRESERVATION OF MOUSE LYMPHOCYTES WITH DIMETHYL SULFOXIDE,
by M. J. Ashwood-Smith. 6 Nov 63, 22p.
Proj. SR011 01 01, Task 0401
NRDL TR689 Unclassified report

Descriptors: (*Lymphocytes, Preservation), Low temperature research, Viability, Blood, Mice, Sulfoxides, Alkanes.

Dimethyl sulfoxide has been shown to protect a variety of animal cells from the damaging effects associated with cooling to, storage at, and thawing from very low temperatures. This paper describes the successful preservation of mouse lymphocytes at -196 C with dimethyl sulfoxide. Viability of preserved lymphocytes was assessed by several in vitro techniques which included phase-contrast microscopy, motility studies and protein synthesising activity. The biological assessment of fresh and frozen lymphocytes was demonstrated in a splenomegaly assay system in which lymphocytes from mice of a parental strain were injected into F sub 1 hybrids. The results of both in vitro and in vivo tests indicated that more than 50 percent of the lymphocytes were viable after storage at -196 C for three months. Dimethyl sulfoxide was shown to be superior to glycerol as a low temperature preservative agent for lymphocytes. (Author)

17. METALLURGY

AD-426 688 Div. 17, 26
OTS price $.75

Research and Technology Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
VACUUM ARC MELTING OF EXPERIMENTAL REFRACTORY METALS,
by S. Inouye. Nov 63, 22p.
Proj. 7351, Task 735101
RTD TDR63 4089 Unclassified report

Report on Metallic Materials.

Descriptors: (*Refractory metals and alloys, Melting), (*Melting, Electric arcs), Vacuum furnaces, Tungsten, Additives, Oxygen, Titanium, Carbon, Zirconium, Electrodes, Grain structures (Metallurgy), Electric currents, Molybdenum, Niobium, Tungsten alloys, Molybdenum alloys, Niobium alloys, Rhenium alloys, Titanium alloys, Carbon alloys, Boron alloys, Zirconium alloys, Tantalum alloys, Hafnium alloys.

Vacuum arc melting of experimental refractory metals at the Experimental Metals Processing Facility is summarized. The influence of furnace design modifications and melt variables on electrode melt rates is shown. Minor additions of oxygen and titanium to tungsten electrodes reduce the melt rate and additions of carbon and zirconium cause no significant change in melt rate. Increased melting current also increases electrode consumption rate. In general, coarser macrostructures are associated with slower melt rates. (Author)

AD-426 698 Div. 17
OTS price $.75

Pennsylvania State U., University Park.
FIELD ION MICROSCOPY OF IRON WHISKERS.
Final rept., 1 June 62-30 June 63,
by Erwin W. Muller and Osamu Nishikawa. Nov 63, 21p.
Contract AF33 616 6397, Proj. 7353, Task 735304
ASD TDR63 138, pt. 2 Unclassified report

Report on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances.

Descriptors: (*Single crystals, Iron), (*Iron, Single crystals), (*Electron microscopy, Field emission), Neon, Helium, Crystal structure, Microstructure, Crystal lattice defects, Impurities, Evaporation, Image intensifiers (Electronics), Wire.

Field ion microscopy of non-refractory metals was improved by the use of neon and neon-helium gas mixtures. A limited number of iron whiskers was observed and found to contain a high density of lattice defects, such as impurity atoms, single dislocations, and dense dislocation areas of an almost amorphous structure, particularly in the 111 region. The latter defect is an artifact caused by the stress of the evaporation field. Further progress will depend upon a reduction of this field, and the use of an image intensifier. (Author)

AD-426 848 Div. 17, 26
OTS price $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
EFFECTS OF THERMO-MECHANICAL VARIABLES ON THE TEXTURE AND BEND DUCTILITY OF HIGH PURITY BERYLLIUM SHEET.
Interim rept. 15 July-15 Dec 63.
15 Dec 63, 8p. Rept. no. I B2106 1
Contract AF33 657 11234
Unclassified report

Descriptors: (*Beryllium, Sheets), (*Sheets, Beryllium), Material forming, Hot working,

Forging, Rolling (Metallurgy), Temperature, Deformation, Ductility, Microstructure, Powder metals.

Progress is reported on an investigation to determine the effects on beryllium sheet properties (texture, bend, ductility, and strength) of the use of high purity material and deformation procedures which minimize basal plane texturing. The material chosen was the highest purity powder available commercially in reasonable quantities (SR Pechiney). The deformation procedures chosen are hot upsetting, hot forging, and compression rolling. The objective of this program is to attain beryllium sheet with good bend ductility combined with useful strength properties by means of heat treatment, the control of basal plane texture, and the use of high purity and fine grain size (established by the use of powder) material. (Author)

AD-426 927 Div. 17, 25
OTS price $9.10

Stockholm U. (Sweden).
PHASE ANALYSIS AND CRYSTAL STRUCTURE STUDIES ON BINARY ALLOYS OF ALUMINUM WITH TRANSITION METALS.
Final technical rept., 1 Nov 62-31 Oct 63,
by Arne Magneli, Lars-Erik Edshammar and Tore Dagerhamn. Nov 63, 1v. Rept. no. 1
Contract DA91 591EUC2734
Unclassified report

Descriptors: (*Aluminum alloys, Crystal structure), (*Phase studies, Aluminum alloys), X-ray diffraction analysis, Transition elements, Hafnium alloys, Manganese alloys, Molybdenum alloys, Niobium alloys, Osmium alloys, Palladium alloys, Platinum alloys, Rhenium alloys, Rhodium alloys, Ruthenium alloys, Tantalum alloys, Titanium alloys, Tungsten alloys, Vanadium alloys, Yttrium, Zirconium alloys, Bibliographies.

In order to provide the necessary background for detailed crystal-chemistry studies in the field of binary aluminum - transition metal systems, extensive investigations have been carried out on the phase relations of a large number of such systems. The results of these studies are briefly summarized, as are also the results of crystal structure determinations of a few aluminum - transition metal phases. (Author)

AD-426 957 Div. 17, 26
OTS price $5.60

Solar, San Diego, Calif.
EVALUATION OF RMSP TUNGSTEN SHEET.
Quarterly progress rept. 2, 1 Oct-31 Dec 63,
by F. St. Germain and M. R. Licciardello.
15 Jan 64, 49p. ER1399 2
Contract NOw63 0786d, Proj. 3478 62
Unclassified report

Descriptors: (*Tungsten, Sheets), (*Sheets, Tungsten), Thickness, Mechanical properties, Chemical analysis, Microstructure, Hardness, Recrystallization, Transition temperature, Ductility, Grain structures (Metallurgy), Brittleness, High temperature research, Tensile properties, Material forming.

The 0.010-, 0.020-, 0.060-, and 0.100-in. thick Refractory Metals Sheet-Rolling Program (RMSP) tungsten sheets were evaluated by standard acceptance test methods. Chemical analysis, microstructural evaluation, hardness measurements, bend transition studies, and elevated temperature mechanical property determinations were performed and the results were recorded for the serialized sheet material. The results obtained during acceptance testing indicated that there were differences between individual sheets within each gage lot of sheet material. These differences could be due to prior processing history, however sufficient data are not available to allow for detailed tracing of each sheet produced. Hot square shearing and hot rotary shearing investigations were conducted on each of the four gages of RMSP tungsten material. Results of the shearing studies showed that successful shearing could be expected by control of temperature of sheet material, type, and condition of tooling used. (Author)

AD-426 964 Div. 17
OTS price $4.60

IIT Research Inst., Chicago, Ill.
EMBRITTLEMENT OF METALS BY ORGANIC LIQUIDS.
Summary rept., 1 Dec 62-30 Nov 63.
2 Jan 64, 37p. Rept. no. IITRI B183B2 4
Contract DA11 022ORD3108
Unclassified report

Descriptors: (*Aluminum, Brittleness), (*Steel, Brittleness), (*Brittleness, Metals), (*Organic compounds, Brittleness), Tensile properties, Fatigue (Mechanics), Failure (Mechanics), Fracture (Mechanics), Water, Ethers, Alcohols, Aldehydes, Solutions.

High-strength steel and aluminum are shown to be embrittled in notched fatigue testing in the presence of water, alcohols, glycols, ethers, and aldehydes. It is shown that longer carbon chains, branching molecular shapes, and closed rings reduce the degree of embrittlement while multiplicity of (-OH) or (-O-) groups enhance it. By a variety of experiments and deductions, water is shown to behave more like a zero chain length organic molecule rather than an electrolytic medium. (Author)

AD-426 988 Div. 17
OTS price $3.60

Aerospace Corp., Los Angeles, Calif.
A MICROPLASTICITY STUDY OF DISPERSION STRENGTHENING IN TD-NICKEL,
by J. E. White and R. D. Carnahan. 20 Dec 63,
26p. Rept. no. TDR269 4240 10 4
Contract AF04 695 269
SSD TDR63 346 Unclassified report

Descriptors: (*Nickel alloys, Dispersion hardening), (*Dispersion hardening, Nickel alloys), Thorium compounds, Oxides, Deformation, Strain (Mechanics), Cold working, Heat treatment, Plasticity, Stresses, Hardness, Electron microscopy, Tensile properties, Microstructure, Recrystallization, Crystal lattice defects, Grain boundaries, Rods, Sheets, Creep.

A study of dispersion strengthening in TD-Nickel was conducted employing microstrain techniques at ambient room temperature. Optimum strength was due primarily to the incorporation of stored energy developed by a variety of thermal-mechanical treatments. The relatively low strength of the recrystallized condition implies that dispersed particles themselves offer only token resistance to deformation. The development of resistance to large scale recovery or recrystallization at temperatures near the melting point requires a more extensive sequence of strain-anneal cycles than does the development of optimum strength. A micro-Bauschinger was ob-

served which appears related to lattice resistance to the movement of free dislocations. The effect was almost identical to that in pure nickel. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-426 521 Div. 18
OTS price $1.60

Arctic Inst. of North America, Washington, D. C.
AN ANALYSIS OF ENVIRONMENTAL FACTORS AFFECTING ARMY OPERATIONS IN THE ARCTIC BASIN,
ed. by John E. Sater. Feb 62, 16p.
Unclassified report

Descriptors: (*Army operations, Polar regions), Environmental tests, Cold weather tests, Military tactics, Operations research, Climatology, Logistics, Transportation, Communication systems, Army equipment, Factors analysis.

AD-426 683 Div. 18, 16
OTS price $2.60

6595th Aerospace Test Wing, Vandenberg Air Force Base, Calif.
DISASTER CONTROL PROGRAM FOR AN AEROSPACE BASE, PRESENTED AT THE AMERICAN INDUSTRIAL HYGIENE ASSOCIATION CONFERENCE ON 8 MAY 1963, SHERATON-GIBSON HOTEL, CINCINNATI, OHIO,
by Donald G. Silva and Donald I. Carter.
8 May 63, 26p.
Unclassified report

Descriptors: (*Disasters, Control systems), (*Control systems, Disasters), Floods, Tornadoes, Explosions, Fires, Accidents, Nuclear weapons, Countermeasures.

Disaster Control includes those pre-attack measures taken to minimize or prevent loss of operational military capability following enemy attack, postattack emergency recovery procedures, emergency actions in the event of a peacetime nuclear weapon accident, and emergency measures and actions taken to minimize damage and restore operational capabilities following natural disasters or major peacetime accidents. At Vandenberg Air Force Base, this is expanded to include emergency procedures for accidental release of large quantities of toxic chemicals and also recovery operations for accidents involving nuclear-powered space devices. A description of Vandenberg AFB activities is presented. The Disaster Control Program, the organizations involved, and their reaction to a disaster situation are described. The paper concentrates on the medical-industrial hygiene portion of the over-all Disaster Control Program. (Author)

19. NAVIGATION

AD-426 754 Div. 19, 8
OTS price $8.10

Raytheon Co., Bedford, Mass.
INVESTIGATION OF ACTIVE DOPPLER VELOCITY SENSOR.
Final rept., June 62-Oct 63.
1 Oct 63, 1v. BR2604
Contract AF33 657 9241, Proj. 4427, Task 442701
RTD TDR63 4192 Unclassified report

Descriptors: (*Doppler navigation, Boost-glide vehicles), (*Boost-glide vehicles, Doppler navigation), Gain, Bandwidth, Frequency modulation, Radar transmitters, Linear systems, Flight testing, Velocity, Doppler radar, Oscillators, Traveling wave tubes, Production, Performance (Engineering).

Presented is a summary of the results of a study program directed toward the advancement of the state-of-the-art of Doppler navigation radar techniques to meet the requirements of a boost-glide vehicle. The spectral compression technique was the principal subject of investigation, and effort was divided into the following areas: (1) development of a wide frequency deviation, highly linear, low noise, microwave, FM/CW transmitter; (2) development of a Computer and Control Unit capable of automatic modulation slope control and Doppler frequency computation; (3) flight testing of the developed equipment; and (4) theoretical analysis in support of equipment development and of subjects relating to the physics of spectral compression. The investigation of spectral compression culminated in the successful flight demonstration of the technique in a B-26 aircraft. Spectral analysis showed that a direct increase in peak spectral density accompanied the bandwidth reduction. Compression ratios of 10:1 were achieved when viewed over the period of one second and even greater ratios (20 to 30:1) were achieved over several modulation periods. The ability to redistribute the received energy over a narrower bandwidth will allow one to reduce the transmitter power requirements below that required for unmodulated transmission. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-426 572 Div. 20
OTS price $1.10

Washington U., St. Louis, Mo.
EXPERIMENTAL STUDIES IN NUCLEAR PHYSICS.
Final rept., 1 July-15 Oct 63,
by Franklin B. Shull. 15 Oct 63, 4p.
Grant AFOSR383 63
AFOSR J1340 Unclassified report

Descriptors: (*Cyclotrons, Design).

AD-426 573 Div. 20, 25
OTS price $1.10

Washington U., St. Louis, Mo.
PRIMARY COSMIC RADIATION.
Final rept.,
by M. W. Friedlander. 16 June 63, 8p.
Grant AFOSR62 404
AFOSR J1347 Unclassified report

Descriptors: (*Cosmic rays, Nuclei), (*Nuclear reactions, Cosmic rays), Fragmentation, Nuclear scattering, Halocarbon plastics, Polyethylene plastics, Nuclear reactions, Photographic emulsions.

AD-426 787 Div. 20
OTS price $9.60

Hayes International Corp., Birminghan, Ala.
A STUDY OF THE RADIATIVE CHARACTERISTICS OF SHIELDED INFRARED SOURCES.
Interim rept.,
by C. M. Askey, N. D. Gilliam, J. L. Reid and W. S. Harbin. Oct 63, 100p. ER649
Contract DA44 177TC805, Task 1D121401A14802
ATRECOM TR63 45 Unclassified report

Descriptors: (*Infrared radiation, Shielding), Design, Aspect ratio, Radiometers, Blackbody radiation, Instrumentation, Measurement, Infrared spectrophotometers, Programming (Computers), Monte Carlo methods, Intensity, Spectra (Infrared).

An account is presented of an experimental measurements program and an empirical formulation for determining the radiative characteristics of shielded infrared sources. Included is a detailed description of the apparatus and instrumentation used in the experimental program and the computer programs for predicting radiant intensity as a function of aspect angle. The results of the empirical formulation when compared with the experimental measurements clearly indicate the feasibility of this method. (Author)

AD-426 796 Div. 20
OTS price $1.10

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST COORDINATE INDEX - PART II FOR ACCESSION LISTS FROM OCTOBER 1, 1963 TO DECEMBER 31, 1963.
10 Jan 64, 5p.
Unclassified report

Descriptors: (*Subject indexing, Nuclear physics), Radiation damage, Organic materials, Inorganic compounds, Metals, Electronics, Space environmental conditions, Nuclear energy, Environmental tests.

The inverted concept-coordinate index is based upon terms generated in the REIC subject files. The index is subdivided into two sections. The first, Radiation Environment, includes dosimetry and energy aspects of all electromagnetic and particulate radiation sources, with the exception of space radiation. Section two deals with materials, properties, secondary environment (including space environments), devices, and all other subject concepts. (Author)

AD-426 797 Div. 20
OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST. ABSTRACT NO. 21254 TO 21301, PART I.
Rept. for 1-31 Dec 63.
10 Jan 64, 19p. AL70
Contract AF33 615 1124
Unclassified report

Descriptors: (*Abstracts, Radiation damage), (*Radiation damage, Abstracts), Materials, Metals, Ceramic materials, Organic materials, Bibliographies, Polymers, Electronic equipment, Space environmental conditions.

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-426 545 Div. 22, 12
OTS price $8.10

Army Missile Command, Redstone Arsenal, Huntsville, Ala.
THE APPLICATION OF SAMPLED-DATA CONTROL TO AN ANTI-TANK MISSILE,
by Gordon D. Welford and William W. Malcolm.
8 Oct 63, 77p.
Proj. GC31 63
AMC RA RG TR63 21 Unclassified report

Descriptors: (*Antitank ammunition, Control systems), (*Control systems, Projectiles), (*Projectiles, Control systems), Sampling, Data, Control, Analog computers, Frequency, Airframes, Performance (Engineering), Guidance, Digital systems, Digital-to-analog converters, Digital computers, Guided missiles, Mathematical analysis, Simulation, Feasibility studies.

The feasibility of a sampled-data control system for a close support missile, such as the anti-tank missile, is studied primarily from the standpoint of performance. Realistic requirements which reflect the limitations of available hardware are placed on the system. Airframe inertia and inertia changes are characteristic of a hypervelocity anti-tank missile which is under preliminary development by the Future Missile Systems Division of the Army Missile Command. A

comparison is made between the continuous-data system and the sampled-data system, which are designed to meet the same requirements. The study is made through mathematical analysis aided by analog computer simulation. (Author)

AD-426 763 Div. 22
OTS price $3.60

Naval Radiological Defense Lab., San Francisco, Calif.
HYDRA PROGRAM - THEORETICAL AND EXPERIMENTAL DETERMINATION OF ENERGY PARTITION OF SELECTED UNDERWATER EXPLOSIVES,
by M. Kaltwasser. 28 Oct 63, 35p.
NRDL TR702 Unclassified report

Descriptors: (*Explosive materials, Energy), (*Underwater explosives, Mathematical analysis), (*Explosion bubbles, Motion), (*Nuclear explosions, Simulation), Theory, Tests, Underwater, Steam, Pentolite, RDX, Feasibility studies.

A summary is presented of the derivation of the equation of motion of the bubble due to an underwater spherical explosion. Migration and surface effects are included. The formulae for the first maximum radius and the first oscillation period, including surface effects, are given. The energy partition of three explosives, Pentolite, RDX + Alum (50/50), and 2H2+02 are calculated. (Author)

23. PERSONNEL AND TRAINING

AD-426 738 Div. 23, 32
OTS price $1.10

RAND Corp., Santa Monica, Calif.
MORE ON GODDARD,
by Amrom H. Katz. Dec 63, 9p. Rept. no. P2838
Unclassified report

Descriptors: (*Personnel, History), Aerial photography, Photographic equipment, Symposia.

AD-426 755 Div. 23, 1
OTS price $4.60

Psychological Research Service, Inc., Austin, Tex.
THE CONSTRUCTION, REVIEW, AND ADMINISTRATION OF AIR FORCE JOB INVENTORIES,
by Wayne B. Archer and Dorothy A. Fruchter.
Aug 63, 36p.
Contract AF41 657 397, Proj. 7734, Task 773401
PRL TDR63 21 Unclassified report

Descriptors: (*Personnel management, Air Force), (*Job analysis, Aviation personnel), (*Aviation personnel, Job analysis), Tables, Standardization.

This project was directed toward improving procedures for constructing and administering Air Force job inventories, using methods described in the current Occupational Analysis Manual. In constructing inventories for 20 airman career ladders, source materials for duty and task statements were evaluated. Review procedures were compared with respect to yield of information from technical advisors (specialty experts), both from field review and from direct interview. Results of administration of 10 inventories to large samples of incumbents showed that efficient use of source materials and technical advisors yielded practically complete inventories, since incumbents produced only a negligible number of task write-ins. Preliminary analyses of the inventory survey of one career ladder (Medical Laboratory) provided job descriptions for each of the 3 specialties. (Author)

AD-426 756 Div. 23
OTS price $1.60

6570th Personnel Research Lab., Aerospace Medical Div., Lackland Air Force Base, Tex.
VALIDITY OF AIRMAN QUALIFYING EXAMINATION, FORM F, FOR TECHNICAL TRAINING GRADES-1961,
by Jane McReynolds. Aug 63, 14p.
Proj. 7717, Task 771705
PRL TDR63 20 Unclassified report

Descriptors: (*Aptitude tests, Air Force), Feasibility studies, Effectiveness, Military personnel, Training, Indexes.

Validity of the 4 aptitude indexes derived from the Airman Qualifying Examination, Form F, was determined for final grades in 49 airman training courses. The selected samples graduating in 1961 ranged in size from 30 to 2233 with only 3 courses that had less than 100 graduates. Appropriateness of the selector indexes for their specialty clusters was evidenced by their having the highest validity for all but 2 of the 49 courses. The Electronics AI was the most effective, the Administrative AI the least. 8 figures illustrate graphically the relationship between scores on the aptitude index and success in training. These validation data demonstrate that the Airman Qualifying Examination is an effective instrument for use in assigning enlistees to technical training. (Author)

AD-426 827 Div. 23, 1, 28
OTS price $17.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PILOT AND AIRCRAFT. (LETCHIK I SAMOLET),
by V. G. Denisov and R. N. Lopatin. 31 Oct 63, 261p.
FTD TT63 276 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, pp. 1-203, Moskva - 62.

Descriptors: (*Aeronautics, Human engineering), Automatic pilots, Instrumentation, Aerodynamic characteristics, Aerodynamic configurations, Control systems, Physiology, Vision, Hearing, Flight clothing, Reflexes, Instrument flying, Perception, Pilots.

The authors of the book discuss various links between the pilot and the aircraft he is flying, the part played by psycho-physiological factors in human beings when controlling present-day aircraft. The book considers the basic properties

of an aircraft as a guided object, various instruments and automatic devices as sources of information while flying the aircraft, and deals with technical means of ensuring survival for aircraft crews during high altitudes and high velocity flights as well as during flights through space. (Author)

AD-426 832 Div. 23
OTS price $2.40

Directorate of Personnel and Support Operations, Wright-Patterson Air Force Base, Ohio.
STUDIES OF AIR FORCE EXECUTIVES III. PRETESTING A TASK INVENTORY FOR EXECUTIVES (TIE) OF THE AFLC,
by William R. Bell and Harry D. Wilfong.
1 Nov 63, 24p.
AFLC PRP EM63 1 Unclassified report

Descriptors: (*Air Force, Officer personnel), (*Officer personnel, Job analysis), Performance tests, Tables.

A 100 item experimental Task Inventory for Executives (TIE) was derived and developed from Hemphill's (1960) factor analysis of executive tasks by Teller and Camm (1962). The inventory was pretested on 80 Headquarters USAF executives at 4 levels within 9 Air Force functions (Camm and Teller, 1963). Results were analyzed on the basis of 3 sets of scores for (1) Criticality of Tasks, (2) Frequency of Performance, and (3) Performance of Tasks. This study replicated the design of the 1963 Camm and Teller study and pretested the inventory on a sample of 66 AFLC executives at 3 levels within 8 AFLC functions. The results of this study showed no significant differences between levels or functions regarding criticality, frequency or performance of tasks covered by the inventory. (Author).

AD-426 850 Div. 23, 28, 29
OTS price $1.60

Honeywell Research Center, Hopkins, Minn.
ASTRONAUT MANEUVERING UNIT ATTITUDE CONTROL SYSTEM. A REPORT BIBLIOGRAPHY, 1960 - 1963, comp. by C. S. Rank. Jan 64, 9p. Rept. no. RB64 1
Unclassified report

Descriptors: (*Aviation personnel, Bibliographies), (*Attitudes, Control systems), Aviation personnel, Life support, Performance tests, Human engineering.

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-426 695 Div. 24
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE CONVEYER - PHOTO CAMERAS,
by T. Fetisov. 4 Dec 63, 5p.
FTD TT63 842 1 Unclassified report

Descriptors: (*Cameras, Production), Newspapers, Manufacturing methods, Processing.

Assembly line construction procedures at the Krasnegerskiy Mechanical Plant are presented for the Zenit, Moskva and a whole family of Zorki photo cameras which are used by Soviet and foreign photo amateurs and professionals. (Author)

AD-426 753 Div. 24
OTS price $10.50

Radio Corp. of America, Bethesda, Md.
RAPID IDENTIFICATION AND INTERPRETATION TECHNIQUES,
by Richard L. Krumm and Alfred J. Farina, Jr.
Nov 63, 107p.
Contract AF30 602 2806, Proj. 6244, Task 624401
RADC TDR63 421 Unclassified report

Descriptors: (*Target recognition, Photo interpretation), (*Photo interpretation, Target recognition), (*Photographic intelligence, Target recognition), Feasibility studies, Performance tests, Analysis, Training.

This report describes an experimental investigation of the feasibility of utilizing a rapid presentation technique to improve the target recognition performance of photo interpreters. The test imagery involved a wide variety of military targets presented at various image scales and image quality. A four day training course administered to a group of experienced photo interpreters effected 50 percent reduction in time required to identify military targets with no loss in either accuracy or completeness. Data analysis also indicated significant interactions among interpreters measures and such display variables as image scale, target to background contrast, and image complexity. This report will be of particular interest to persons concerned with photo interpretation research and training. (Author)

25. PHYSICS

AD-426 503 Div. 25, 26
OTS price $1.10

General Electric Co., Schenectady, N. Y.
PREPARATION TECHNIQUES FOR GROWTH OF SINGLE CRYSTALS OF NONMETALLIC MATERIALS.
Quarterly technical rept. no. 2, 1 Sep-30 Nov 63, by E. M. Clausen and J. W. Rutter. Dec 63, 7p.
Rept. no. 63GC0260M
Contract AF49 638 1247, ARPA Order 447
Unclassified report

Descriptors: (*Single crystals, Crystal growth), (*Crystal growth, Ceramic materials), (*Ceramic materials, Crystal growth), Heat, Argon, Plasma jets, Zone melting, Nickel compounds, Oxides, Cobalt compounds, Aluminum compounds, Powders, Purification, Density.

Techniques for growth of high-purity single crystals of nonmetallic materials are to be developed. The two approaches are single-crystal growth by the Verneuil technique using an r-f coupled plasma of argon as a heat source and crystal growth by the floating zone technique. The heat source for the floating zone technique will be either an oxide susceptor, such as stabilized zirconia, or direct r-f coupling to the nonmetallic material. (Author)

AD-426 520 Div. 25
OTS price $1.10

Radiation and Solid State Physics Lab., New York U., N. Y.
(No title).
Rept. for 1 Oct 62-30 Sep 63.
18 Dec 63, 8p.
Contract Nonr28541
Unclassified report

Descriptors: (*Electroluminescence, Single crystals), Aromatic compounds, Halocarbon plastics, Fluorescence, Electrodes, Crystal growth, Dielectric properties.

AD-426 562 Div. 25, 17
OTS price $3.60

Pennsylvania State U., University Park.
MECHANISM OF FATIGUE IN CLOSE PACKED CRYSTALS.
Final technical rept.,
by M. A. Wilkov. Oct 63, 23p.
Grant AF AFOSR62 273
AFOSR J1364 Unclassified report

Descriptors: (*Metallic crystals, Fatigue (Mechanics)), (*Metals, Fracture (Mechanics)), Nucleation, Propagation, Crystal lattice defects, Metallography, Electron microscopy, Cryogenics, Low temperature research, Crystal structure, Aluminum, Stainless steel, Theory.

Face-centered cubic materials of high and low stacking fault energy were fatigued at both room temperature and liquid nitrogen temperature. Observation of the mode of crack formation, using the electron microscope together with a process of successive replication, showed that the fatigue crack begins as a series of surface cavities which propagate and join to form a microcrack. Application of low temperature did not change this basic behavior except to make the cavity formation process more discrete and bear a closer resemblance to the void formations observed in high temperature creep. Such void formations have been attributed to a process of vacancy condensation. Based upon this observation, a low-temperature fatigue mechanism was proposed which utilizes the dislocation to sweep up point defects, created by the non-conservative motion of dislocation jogs, and deposit them on suitable nuclei on the external surface to form voids. (Author)

AD-426 569 Div. 25, 10
OTS price $1.10

Guggenheim Jet Propulsion Center, Calif. Inst. of Tech., Pasadena.
ABSOLUTE INTENSITY MEASUREMENTS AND GAS EMISSIVITIES AT ELEVATED TEMPERATURES AND PRESSURES.
Final technical rept. for 15 Nov 62-31 Dec 63. 31 Dec 63, 4p.
Contract AF49 638 984 and Grant AFOSR7163
AFOSR J1337 Unclassified report

Descriptors: (*Gases, Molecular spectroscopy), (*Molecular spectroscopy, High-temperature research), (*Water vapor, Molecular spectroscopy), (*Chromium compounds, Molecular spectroscopy), Exhaust gases, Mixtures, Hydrogen compounds, Oxygen compounds, Shock tubes, Absorption spectrum, Emissivity, Carbonyl groups, Combination, Ions, Chromium, Reviews, Diatomic molecules, Thermodynamics, Heat transfer, Hydroxides.

Similarity groups were derived for multicomponent, reacting gas mixtures with radiative energy transport. Resulting relations were used to consider the feasibility of scaling for flow processes with radiative energy transport under highly simplified conditions. Oscillator strength and spectroscopic temperature determinations on OH in a shock tube were carried out. The shock tube study of the 2.7 - 3.2 micron band of water vapor, was continued. The purpose of this study was simultaneous measurement of the absolute intensity of the band both in emission and in absorption at 1000 K. This objective was accomplished and emission measurements were made at 3000 K. Extensive data were collected on the absolute gf numbers of several lines of neutral and ionized chromium carbonyl. Data on the relaxation times for excitation and ionization of chromium were also obtained in these experiments. Electronic temperatures for Cr I and Cr II behind reflected shock waves were measured. (Author)

AD-426 570 Div. 25, 15
OTS price $1.10

Institute of Field Physics, U. of North Carolina, Chapel Hill.
(No title).
Status rept. for 1 Oct 62-30 Nov 63.
30 Nov 63, 4p.
Contract Nonr85507 and Grant AF62 120, Proj. NR013 102
AFOSR J1336 Unclassified report

Descriptors: (*Gravity, Field theory), Green's function, Theory, Damping, Quantum mechanics, Relativity theory, Topology, Groups (Mathematics).

AD-426 658 Div. 25
OTS price $1.60

Illinois U., Urbana.
PHYSICS OF THE SOLID STATE,
by Robert J. Maurer. Dec 63, 13p. Technical rept. no. 7
Contract Nonr1834 19, Proj. NR017 412
Unclassified report

Descriptors: (*Potassium compounds, Bromides), (*Dielectrics, Electrical conductance), Polarization, Measurement, Temperature, Heat of formation, Chlorides, Solid state physics.

AD-426 667 Div. 25
OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
INTERFERENCE PROPERTIES OF PHOTONS,
by David W. Ross. Nov 63, 19p.
Proj. 4645
AFCRL 63 788 Unclassified report

Descriptors: (*Photons, Interference), (*Quantum mechanics, Photons), Quantum statistics, Correlation techniques, Intensity, Interferometers, Theory.

The Brown-Twiss photon correlation effect is discussed in purely quantum-mechanical terms. It is shown that for states incoherent in the sense that the phase of the electric field component at each frequency is unknown, Bose commutation relations imply the existence of intensity beats at all the difference frequencies. This result does not depend on lack of knowledge of the number of photons at each frequency; the beats are obtained even if the state is known to be an n-photon one. This derivation is compared with the classical theories of Brown and Twiss, and Purcell. A discussion is also given of interference in spatially localized states. (Author)

AD-426 672 Div. 25
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LIQUID CRYSTALS,
by A. Volkov and I. Christyakov. 5 Dec 63, 7p.
FTD TT63 958 Unclassified report

Trans. from Tekhnika Molodezhi, no. 9, pp.22-23, 1960.

Descriptors: (*Crystals, Liquids), Optical properties, Anisotropy, Isotropism, Viscosity, Cholesteryl esters, Crystal lattices.

AD-426 720 Div. 25
OTS price $1.10

Institute for Defense Analyses, Washington, D. C.
FUNDAMENTAL LIMITATIONS ON USE OF MASER AMPLIFICATION FOR IMAGE INTENSIFICATION,
by C. H. Townes. Aug 61, 3p. TN61 20; UBG61 157
Unclassified report

Descriptors: (*Image intensifiers (Electronics), Lasers), (*Masers, Illumination), Light, Blackbody radiation, Oscillators.

AD-426 750 Div. 25, 26
OTS price $2.60

Inland Testing Labs., Dayton, Ohio.
QUARTZ CRYSTAL RELIABILITY STUDIES.
Quarterly rept. no. 1, 1 July - 1 Oct 63,
by Carleton E. Jones. 1 Oct 63, 19p.
Contract DA36 039AMC02350, Task 24 11 912 01
Unclassified report

Descriptors: (*Quartz, Crystals), (*Reliability (Electronics), Tests), Crystal holders, Oscillators, Design, Measurement, Quality control, Temperature, Temperature control, Failure (Mechanics), Life expectancy.

All crystal units required for Phase I have been ordered, and several partial shipments have been received. All crystal units that have been received are now being subjected to the preproduction tests of MIL-C-3098C. An identification system for all Phase I crystals are established. (Author)

AD-426 752 Div. 25
OTS price $6.60

Systems Research Labs., Inc., Dayton, Ohio.
LOW ENERGY ELECTRON DIFFRACTION FROM SINGLE CRYSTAL SURFACES. I. APPARATUS DESIGN.
Rept. for 1 Feb-1 Aug 63,
by E. L. Kern, D. E. Floyd and P. W. Bunce.
Nov 63, 53p.
Contract AF33 657 10798, Proj. 63 8 7023, Task 7023 05
ARL 63 197 Unclassified report

Descriptors: (*Electron diffraction analysis, Single crystals), (*Instrumentation, Design), Metals, Semiconductors, Energy, Cathodes, Vacuum apparatus, Electron guns, Synchros, Circuits, Anodes.

A low energy electron diffraction apparatus has been designed, developed, and constructed and will be used to study the surface condition and structure of single crystal metals and semiconductors. The electron gun is adapted from a design by Farnsworth, uses a nickel matrix cathode, and is capable of producing electrons with energies of 20 to several hundred electron volts with currents from 0.1 to 10 microamperes. The electrons diffracted from a surface can be scanned over a majority of an octant (0-75 degree colatitude 0-90+ degree azimuth) using the general approach of Farnsworth, and currents as low as 1 times 10 to the -13th power amperes can be measured at the collector. An angle programmer has been developed to precisely program the angles to be swept, and the angular motion is transferred through a glass chamber wall by a pair of magnetic couplers. The apparatus and some of its characteristics are described. (Author)

AD-426 769 Div. 25
OTS price $5.60

Elcon Lab., Inc., Watertown, Mass.
HIGH POWER MAGNETICALLY CONFINED PLASMA DUPLEXER.
Quarterly rept. no. 1, 31 May-31 Aug 63,
by Edwin Langberg and Wellesley Dodds.
31 Aug 63, 1v.
Contract DA36 039AMC02364E, Task IGG22001A055 04
Unclassified report

Descriptors: (*Plasma medium, Magnetic pinch), Magnetic pinch, Plasma medium), Power, Diffusion, Magnetic fields, Heat transfer, Gases, Geometry, Cylindrical bodies, Mirrors, Measurement, Experimental data, Design.

The calculation of the effect of reduction of ambipolar diffusion across the magnetic field on heat dissipation and gas clean-up of a duplexer filled with Penning mixture of noble gases is performed. Magnetic confinement geometries of cylindrical, toroidal, mirror and cusp shapes are discussed. The result of preliminary measurements on cylindrical confinement are presented. The experimental design based on the cusp confinement is described. (Author)

AD-426 775 Div. 25
OTS price $2.60

Parke-Mathematical Labs., Inc., Carlisle, Mass.
ENERGY STRAGGLING IN A SERIES OF ABSORBING LAYERS,

by Nathan Grier Parke III, Wentworth Williams Jr. and Charles H. Sherman. Nov 63, 17p. Scientific rept. no. 1
Contract AF19 628 2419, Proj. 5620, Task 562002
AFCRL 63 558 Unclassified report

Descriptors: (*Electron beams, Absorption), Boundary value problems, Integral transforms, Functions.

The Landau theory of energy straggling is extended to provide a method of calculating straggling distributions for a beam of charged particles which has penetrated more than one layer. With this method the common experimental situation in which a beam penetrates several absorbing layers before entering the material under study can be handled almost as easily as the case of one layer. Approximations involved are consistent with the Landau theory and results valid for thin layers. (Author)

AD-426 779 Div. 25
OTS price $8.60

Antenna Lab., Calif. Inst. of Tech., Pasadena.
ON THE DOPPLER EFFECT IN A MEDIUM,
by K. S. H. Lee. Dec 63, 88p. TR no. 29
Contract AF49 638 1266 and Grant AF AFSOR70 63
AFOSR 5367 Unclassified report

Descriptors: (*Scattering, Field theory), (*Field theory, Scattering), Doppler effect, Electromagnetic waves, Plasma medium, Partial differential equations, Differential equations.

The problem of calculating the frequency of the wave scattered by a body moving in a medium is formulated from field-theoretic considerations. The Doppler equation for a homogeneous dispersive medium is obtained on the basis of the fact that the frequency and the wave vector of a plane wave form a 4-vector. It is found that the solutions of the Doppler equation can be classified into two kinds. In one kind, the solutions are close to the frequency of the incident wave. In the other kind they appear near the poles of the refractive index of the medium on the omega-axis. In the case of an isotropic plasma, the monochromaticity of the incident wave is shown to be preserved after the wave is scattered by a moving body. However, in the case of a magneto-active plasma, the scattered wave contains more than one frequency for a monochromatic incident wave. The physical interpretations of these frequencies are given. In an inhomogeneous medium the Doppler equation has to be derived from a different starting point. The crucial point of the derivation is to perform spectral decompositions of the transformed fields and then to apply, under the assumption of gradual inhomogeneity, the method of stationary phase to determine the critical points. (Author)

AD-426 789 Div. 25
OTS price $3.60

Coordinated Science Lab., U. of Illinois, Urbana.
(No title).
Progress rept. for June-Aug 63.
25 Sep 63, 50p.
Contract DA36 039AMC02208E, Proj. 3A99 25 004
AEC NP13274 Unclassified report

Descriptors: (*Reports, Research program administration), Gyroscopes, Vacuum apparatus, Circuits, Tests, Programming (Computers), Atomic spectroscopy, Measurement, Photons, Emissivity, Digital computers, Real time, Game theory, Artificial intelligence, Teaching machines, Adaptive control systems, Computer logic, Design, Feedback, Sensitivity, Calculus of variations, Networks, Communication system, Communication theory, Ionization gages, Pressure, Plasma physics, Incoherent scattering, Superconductors, Electrodes.

AD-426 801 Div. 25, 4
OTS price $.50

Free U. of Brussels (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURES. PART XV. THE DISSOCIATION AND POLYMERIZATION ENERGIES OF GROUP IV - GROUP VI MOLECULES,
by J. Drowart and R. Colin. Nov 63, 15p.
Contract AF61 052 225, Proj. 7350, Task 735001
WADD TR60 782, pt. 15 Unclassified report

Report on Refractory Inorganic Non-Metallic Materials.

Descriptors: (*Diatomic molecules, Thermochemistry), (*Polymerization, Diatomic molecules), (*Mass spectroscopy, Diatomic molecules), Thermodynamics, Dissociation, Energy, Stability, Enthalpy, Chemical reactions, Vapors, High temperature research, Experimental data.

A summary of the mass spectrometric investigation of the vapor phase of group IV-group VI compounds is given. Thermochemically obtained values for the dissociation energies of the MeX molecules are compared to the spectroscopic values. Polymerization energies of MeX and atomization energies of MeX3 molecules are presented. (Author)

AD-426 819 Div. 25
OTS price $.50

Brussels U. (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS AT HIGH TEMPERATURES. PART XIX. MASS SPECTROMETRIC DETERMINATION OF THE DISSOCIATION ENERGY OF THE MOLECULES Sc2, Y2, La2 AND YLa,
by G. Verhaegen, S. Smoes, and J. Drowart.
Nov 63, 6p.
Contract AF61 052 255, Proj. 7350, Task 735001
WADD TR60 782, pt. 19 Unclassified report

Report on Refractory Inorganic Non-metallic Materials.

Descriptors: (*Diatomic molecules, Mass spectroscopy), (*Mass spectroscopy, Diatomic molecules), Scandium, Yttrium, Lanthanum, Dissociation, Energy, High temperature research, Vaporization, Thermodynamics, Vapors.

The diatomic molecules Sc2, Y2, La2 and YLa have been identified mass spectrometrically in the vapors above condensed scandium, yttrium, lanthanum and Y-La alloys respectively. Their dissociation energies are Sc2 = 25.9 ± 5, Y2 = 37.3 ± 5, La2 = 57.6 ± 5 and YLa = 47.3 ±5 kcal/mole. (Author)

AD-426 820 Div. 25
OTS price $1.50

Brussels U. (Belgium).
VAPORIZATION OF COMPOUNDS AND ALLOYS OF HIGH TEMPERATURE. PART XVIII. MASS SPECTROMETRIC AND KNUDSEN CELL VAPORIZATION STUDIES OF IIb - VIb COMPOUNDS,
by P. Goldfinger and M. Jeunehomme. Nov 63, 44p.
Contract AF61 052 225, Proj. 7350, Task 735001
WADD TR60 782, pt. 18 Unclassified report

Report on Refractory Inorganic Non-metallic Materials.

Descriptors: (*Mass spectroscopy, Vaporization), (*Vaporization, Mass spectroscopy), (*Thermodynamics, Vapors), Vapor pressure, Ionization, Zinc compounds, Lead, Cadmium compounds, Mercury compounds, Sulfides, Selenides, Tellurides, Bibliographies, Heat of reaction, Dissociation, High temperature research, Heat of formation, Intermetallic compounds, Energy.

The vaporization process of the compounds of Zn, Cd, Hg with S, Se, Te has been studied by mass spectrometry. The heat of decomposition of all these compounds to Me(g)+1/2 X2(g) has been measured by the mass loss Knudsen technique. Experimental data are compared with literature data. Heats of atomization of these compounds are compared to isosteric compounds and upper limits for the dissociation energies of the gaseous molecules are given. (Author)

AD-426 825 Div. 25
OTS price $.75

Naval Research Lab., Washington, D. C.
EXPLODING CONDUCTORS.
Final rept. 30 June 60-30 June 63,
by W. R. Faust, G. E. Leavitt, J. D. Shipman, Jr., I. M. Vitkovitsky, and F. D. Harrington.
31 Oct 63, 19p.
NRL 6009 Unclassified report

Descriptors: (*Exploding wire, Analysis), Tests, Spectroscopy, Instrumentation, X-rays, Spectra (Visible and ultraviolet), Plasma medium, Explosions, Vacuum.

This report is the summary of the work done at the U. S. Naval Research Laboratory between June 30, 1960 and June 30, 1963. It contains the material that has been discussed in detail in a series of progress reports. In addition, some of the work has been published and is referenced at the end of the report. The work reported here deals with the investigation of electrically exploded wires in vacuum. The electrical pulses needed for this purpose were provided by the very low inductance capacitors, the development of which was part of the work covered here. The main problems considered were (a) the x-ray, visible, and near ultraviolet emissions from the explosions, (b) the development of the instrumentation needed to determine the time history of the current through and the voltage across the exploding wires, and (c) the relation of the current and voltage to the energy dissipated in the explosion. The techniques that were employed in the study of the various emissions are outlined. The appendix contains detailed discussion of the radiation measurements in the visible range and its analysis. (Author)

AD-426 829 Div. 25
OTS price $1.60

Redstone Scientific Information Center, Redstone Arsenal, Ala.
DIAGRAM I-x FOR A STEAM-HYDROGEN SYSTEM,
by Anatol Seletsky and Aleksander Blyum.
17 Dec 63, 8p.
RSIC 106 Unclassified report

Trans. from Khimicheskaya Promyshlennost Vol. 5, pp. 411-413, 1960.

Descriptors: (*Hydrogen, Steam), Thermodynamics, Moisture, Hygrometers.

AD-426 835 Div. 25, 21, 7
OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SUMMARY OF ELECTRICAL PROPULSION DIAGNOSTIC INSTRUMENTATION,
by James B. Whited. Jan 64, 33p.
Contract AF40 600 1000, Task 695 006
AEDC TDR63 242 Unclassified report

Descriptors: (*Propulsion, Electricity), (*Instrumentation, Propulsion), Plasma physics, Plasma medium, Gas ionization, Tests, Ion beams, Physical, Properties, Electrons, Temperature, Electron density, Ions, Density, Space, Charges, Measurements.

This report summarizes the instrumentation development effort that was initiated at the Arnold Engineering Development Center to effect plasma diagnostics during the long-term testing of electrical propulsion systems. Two different ion beam sources were instrumented to obtain the basic properties of the plasma, such as the electron temperature, electron and ion densities, and the space charge potentials. The basic instrumentation required to effect preliminary diagnostics are the ''plasma eater,'' the positive ion probe, the Langmuir double probe, the Faraday cup, and the emissive probe. With these devices, it is possible to obtain both integral and differential measurements of the beam characteristics. Analysis of the data is also included. (Author)

AD-426 846 Div. 25
OTS price $2.25

National Bureau of Standards, Washington, D. C.
STANDARDIZATION OF THERMAL EMITTANCE MEASUREMENTS. PART IV. NORMAL SPECTRAL EMITTANCE, 800-1400 K,
by William N. Harrison, Joseph C. Richmond, Frederick J. Shorten, and Horace M. Joseph.
Nov 63, 90p.
Contract AF33 616 61 02, Proj. 7360, Task 736001
WADC TR59 510, pt. 4 Unclassified report

Descriptors: (*Spectroscopy, Emissivity), Heating elements, Electric currents, Temperature, Infrared spectroscopy, Errors, Calibration, Punched tape, Digital computers, Tests, Absorption spectrum, Energy, Standards, Distribution.

Equipment and procedures were developed to measure normal spectral emittance of specimens that can be heated by passing a current through them, at temperatures in the range of 800 to 1400 K, and over the wavelength range of 1 to 15 microns. A data-processing attachment for the normal spectral emittance equipment was designed to (1) automatically correct the measured emittance for '100% line' and 'zero line' errors on the basis of previously-recorded calibration tests; (2) record the corrected spectral emittance values and wavelengths at preselected wavelength intervals on punched paper tape in form suitable for direct entry into an electronic digital computer; and (3) to compute during a spectral emittance test on a specimen the total normal emittance, or absorptance for radiant energy of any known spectral distribution of flux, of the specimen. Working standards of normal spectral emittance having low, intermediate and high emittance values, respectively, were prepared and calibrated for use in other laboratories to check the operation of equipment and procedures used for measuring normal spectral emittance. (Author)

Division 25 - PHYSICS

AD-426 871 Div. 25
OTS price $1.60

Westinghouse Electric Corp., Elmira, N. Y.
APPLICATION OF LIGHT AND IMAGE INTENSIFICATION.
Monthly technical engineering rept. no. 4, 1-31 Oct 63,
by Z. Szepesi and W. A. Thornton. 11 Nov 63, 19p.
Contract N613391440
Unclassified report

Descriptors: (*Light, Intensity), (*Image intensifiers (Electronics), Light), Digital computers, Programming (Computers), Programming languages, Sintering, Gain, Cadmium compounds, Selenides, Evaporation, Thin films (Storage devices), Equations.

A parameter study of the PC-EL circuit was initiated with the aid of an IBM 1620 digital computer. The equations used in this study are derived, and the computer program (source program) in FORTRAN language is given. Some figures show a part of the resulting calculations. Changes in the preparation of sintered CdSe layers were made, and some improvements in the characteristics were obtained. Some improvements in the preparation of evaporated EL films were made. In the Appendix the ''Work Program on Image Intensifiers for the Following Two Years'' is attached. (Author)

AD-426 898 Div. 25
OTS price $1.10

Foreign Tech., Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE POSSIBILITY OF LOCATING THE BOUNDARY OF PENETRATING PLASMA BY A BEAM OF CHARGED PARTICLES,
by M. D. Gabovich, O. O. Lozova and L. I. Romanyuk. 10 Dec 63, 7p.
FTD TT63 1089 Unclassified report

Trans. from Ukrains'kiy Fizichniy Zhurnal 8:1, pp. 57-60, 1963.

Descriptors: (*Plasma medium, Boundary layer), (*Charged particles, Plasma medium), Ion beams, Ion sources, Ion current, Ion accelerators, Focusing, Plasma physics, Penetration, Configuration, Electron optics, Electric fields, Lenses, Experimental data.

AD-426 901 Div. 25
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EMF OF THERMOCOUPLES COMPRESSED BY A SHOCKWAVE,
by V. S. Plyukhin and V. N. Kologrivov. 11 Dec 63, 5p.
FTD TT63 1057 Unclassified report

Trans. from Zhurnal Prikladnoy Mekhaniki i Tekhnicheskoy Fiziki, No. 5, pp. 175-176, 1962.

Descriptors: (*Thermocouples, Shock waves), Thermoelectricity, Electromagnetic properties, Pressure.

AD-426 902 Div. 25, 2, 30
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ZEOLITES - MOLECULAR SIEVES,
by P. P. Budnikov and I. M. Petrovykh. 11 Dec 63, 20p.
FTD TT63 979 Unclassified report

Trans. from Priroda (Russian), No. 7, pp. 32-37, 1963.

Descriptors: (*Aluminum compounds, Laboratory equipment), (*Silicates, Laboratory equipment), (*Crystal structure, Aluminum compounds), Minerals, Desiccants, Hydrates, Adsorption, Absorption, Crystal lattices, Crystal growth, Synthesis (Chemistry), Filters.

AD-426 931 Div. 25
OTS price $3.60

Anti-Submarine Warfare Lab., Naval Air Development Center, Johnsville, Pa.
THE ANGULAR DEVIATION OF THE TOTAL MAGNETIC FIELD VECTOR DUE TO A SMALL INDUCED DIPOLE IN A UNIFORM MAGNETIC FIELD,
by R. P. Lepping and P. D. Argentiero. 27 Dec 63, 9p.
Task FR30 3 01
NADC AW 6327 Unclassified report

Descriptors: (*Magnetic fields, Dipole moments), Magnetic moments, Functions, Transformations (Mathematics), Vector analysis.

The angular deviation alpha of the total magnetic field vector produced by a small magnetic dipole induced in isotropic magnetic material in a uniform magnetic field has been calculated. The angular deviation is given in terms of cylindrical coordinates with the origin of the system at the center of the dipole. The function alpha then is maximized with respect to the polar angle, the radius vector, and the angle of inclination of the uniform magnetic field. The maximum value of the component of the total magnetic field perpendicular to the uniform field is derived from the maximized alpha. Since direct means of accurately measuring small values of alpha may prove difficult, an indirect method of obtaining alpha is suggested. (Author)

AD-426 947 Div. 25
OTS price $3.60

Hydrodynamics Lab., Calif. Inst. of Tech., Pasadena.
TORSIONAL MAGNETOELASTIC WAVES IN A CIRCULAR CYLINDER,
by M. E. Fourney and A. T. Ellis. Dec 63, 34p.
Rept. no. E118 3
Contract N123 60530 31686A
Unclassified report

Descriptors: (*Elasticity, Electromagnetic fields), (*Electromagnetic fields, Elasticity), Cylindrical bodies, Mechanical properties), Mechanical waves, Equations, Boundary value problems, Linear systems, Motion, Solids, Electric fields, Propagation, Electrical conductance.

The effect of an electromagnetic field on the propagation of a pure torsional elastic wave in a conducting circular cylinder is investigated. The general field equations and boundary conditions are linearized and the equations of motion for an infinitely long circular rod are obtained for the particular electromagnetic field configurations considered. The torsional motion of a solid rod in a steady axial magnetic field with and without a steady electric field is considered. In the first case it is found that a pure torsional mode will not propagate. In the second case a pure torsional mode will propagate and its frequency equation is obtained. The results for a perfect conductor are compared to a real material. The torsional motion of a hollow rod in a steady tangential magnetic field with and without a steady axial electric field is considered. Without the electric field the equations are completely uncoupled and the solution is the

standard elastic one. The electric field introduces coupling via the induced magnetic field. The equations of motion are obtained; however, the actual solutions are not obtained due to the mathematical complexity involved. (Author)

AD-426 961 Div. 25
OTS price $1.75

Institute for Defense Analyses, Washington, D. C.
PROBLEMS RELATED TO HIGH POWER GAS LASER SYSTEMS,
by W. R. Bennett, Jr. July 63, 69p. RP P39;
IDA HQ63 1806
Contract SD50
Unclassified report

Descriptors: (*Lasers, Gases), (*Transition elements, Analysis), Neon, Helium, Argon, Krypton, Xenon, Cesium, Nitrogen, Mercury, Bromine, Iodine, Sulfur, Carbon, Oxygen, Diffusion, Resonance absorption, Oscillation, Power, Hyperfine structure, Selenium, Tin, Silicon, Tellurium, Lead, Polonium, Germanium, Materials, Electron density, Impurities, Excitation, Plasma medium.

An attempt has been made to fill in some of the development since December 1962 and to add information pertinent to the high-power gas laser problem. A summary of currently known gas laser transitions is given. Summaries of available absolute and relative transition probabilities and other pertinent data are also presented in tabular form. The main effort has gone into the evaluation of existing systems from the point of maximum saturated output power and towards understanding the limitation on the power output and efficiency. It is generally to be expected that the highest output systems will fall at the short wavelength end of the spectrum--although severe complications in these systems may arise from competition by higher gain long-wavelength transitions from the same upper state. It is concluded that the known inelastic collision cross sections for ionizing collisions between pairs of excited atoms are sufficient to rule out gas flow systems of the type considered by Penner. (Author)

AD-426 998 Div. 25
OTS price $1.60

Army Electronics Research and Development Agency, Fort Monmouth, N. J.
MILLIMETER-WAVE GENERATION BY MULTIPLE QUANTUM TRANSITIONS,
by H. G. Andersen. Sep 63, 15p.
Task 1G6 22001A058 03
AELRDL.TR2388 Unclassified report

Descriptors: (*Power supplies, Millimeter waves), (*Lasers, Frequency multipliers), Quantum mechanics, Atomic energy levels, Non-linear systems, Frequency converters, Mathematical analysis, Harmonic oscillators.

Frequency mixing and harmonic generation effects due to nonlinear magnetic or electric susceptibilities, as observed at optical frequencies with high-power laser beams, can be performed at relatively low-power levels in the millimeter-wave region, if all mixing frequencies coincide or are very close to quantum-mechanical resonances of the mixing medium. This report presents a theoretical analysis of power-conversion efficiencies for a totally resonant third-harmonic generation, where both the fundamental frequency and the third-harmonic frequency coincide or are very close to the resonances of an equidistant four-level scheme. The results are compared with previous investigations of partly resonant third-harmonic generation, where only the harmonic frequency is close to a quantum-mechanical resonance of the mixing medium. (Author)

26. PRODUCTION AND MANAGEMENT

AD-426 809 Div. 26
OTS price $6.60

Sylvania Electronic Systems, Needham, Mass.
RELIABILITY PLAN FOR NON-FUNDED SUBCONTRACTORS (MINUTEMAN),
by R. A. Follett and W. Dever. 2 Aug 63, 1v.
Unclassified report

Descriptors: (*Guided missile components, Reliability), Research program administration, Guided missiles (Surface to surface), Reliability (Electronics).

The approach for coordinating, reviewing, monitoring and directing the reliability program is described for Reliability Sensitive Equipment subcontractors who are not funded for an in-house Reliability task. A program of this type must be established and maintained for each of the subcontracted systems, if the Minuteman system is to attain the high degree of reliability set forth. This Program Plan provides a complete description of tasks and implementation of these tasks as they will be performed by Sylvania and/or the subcontractor. In addition, it defines areas of responsibility and lines of authority and control as well as schedule dates and commitments for each of the presently existing subcontracts concerned. (Author)

27. PROPULSION SYSTEMS

AD-426 505 Div. 27, 14, 30
OTS price $15.50

Rocketdyne, Canoga Park, Calif.
STUDY OF O-RING AGING CHARACTERISTICS.
Final rept.
15 Aug 63, 228p. Rept. no. R5253
Contract AF04 607 7339
Unclassified report

Descriptors: (*Gaskets, Aging (Materials)), (*Rocket motors (Liquid propellant), Gaskets), Weapons systems, Life expectancy, Elastomers, Antioxidants, Correlation techniques, Cryogenics, Test methods, Low-temperature research, Oxygen, Experimental data, Tables, Hardness, Tensile properties, Compressive properties, Mathematical analysis, Degradation, Storage, Liquid rocket propellants, Oxidation, Seals (Stoppers).

Presented are the results of an investigation made into several aspects of synthetic elastomer age deterioration to provide information for improved service-life estimates for liquid rocket engines. As a result of the findings of this study, it appears that O-ring (MS28778) properties change as a result of cryogenic exposure in a nonoxidizing environment. The results of this study indicate that there are definite differences in the aging rates of O-rings molded by different manufacturers. It is generally recognized that the principal cause of deterioration of elastomers is oxidation.

Division 27 - PROPULSION SYSTEMS

AD-426 663 Div. 27, 30
OTS price $2.75

Western Electro-Acoustic Lab., Inc., Los Angeles, Calif.
CRITERIA AND SUMMARY OF PERFORMANCE OF PORTABLE GROUND RUNUP SUPPRESSORS FOR JET AIRCRAFT,
by Jose C. Ortega and John W. Little. Nov 63, 124p.
Contract AF33 657 10067, Proj. 8131, Task 813106
RTD TDR63 4112 Unclassified report

Descriptors: (*Jet engine noise, Suppressors), Acoustics, Performance (Engineering), Turbofan engines, Mobile, Temperature, Terrain, Sound, Propagation, Instrumentation, Microphones, Buildings, Meteorological parameters, Humidity, Wind, Velocity, Human engineering, Attenuation, Reduction, Turbojet engines, Acoustic insulation, Maintenance.

Acoustical performance requirements are developed for portable ground runup turbojet engine noise suppressors. The criteria from which the performance requirements are developed are based fundamentally on the known data regarding sound-induced temporary and permanent hearing impairment, communication criteria developed and the results of a noise exposure survey carried out at twenty-two Air Force bases. A main result is that a residual noise level rather than a noise reduction method of acoustical evaluation is recommended. The experience and data of past suppressor evaluations is used to define the current technology of noise suppressor design and to outline areas for future research and development. Also developed are standard procedures and specifications for the acoustical evaluation of a portable ground runup noise suppressor. (Author)

AD-426 674 Div. 27
OTS price $11.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATIC CONTROL OF AIRCRAFT ENGINES (SELECTED ARTICLES).
7 Nov 63, 139p.
FTD TT63 746 Unclassified report

Trans. from Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Oborongiz, no. 3, pp. 1-32 and 51-135, 1961. Moskva.

Descriptors: (*Airplane engines, Instrumentation), (*Turbojet engines, Control systems), Automatic, Aircraft nuclear propulsion, Afterburners, Air, Temperature, Flight control systems, Automatic pilots, Gas turbines, Thermometers, Acceleration, Simulation, Mathematical models, Engine surge, Speed regulators.

Contents: Investigation of dynamic characteristics of temperature sensors for a retarded air flow, The problem of automatic control of a power plant, One method of selecting regulator schemes and parameters, Determining the law of control of acceleration of a turbojet engine, Experimental determination of the dynamic properties of turbojet engines as units in an automatic flight-control system, The turbojet engine and turbojet with afterburner as a unit in automatic aircraft control systems, Equivalence of various diagrams of closed antisurge regulators, Signal conversion during simulation of the dynamic properties of gas-turbine engines.

AD-426 689 Div. 27, 31
OTS price $3.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
EXPERIMENTAL DETERMINATION OF STEAM PURITY CHARACTERISTICS OF NAVAL BOILERS,
by J. W. Banham, Jr. 31 Oct 63, 29p.
RDT&E Proj. SF013 06 16, NBTL Proj. B476, Task 4201
Unclassified report

Descriptors: (*Naval equipment, Boilers), (*Boilers, Driers (Apparatus)), Steam, Steam power plants, Purification, Steam condensers, Performance (Engineering), Tests, Test methods, Moisture, Sodium, Chlorides, Ions, Electrical conductance, Spectrophotometers, Gravimetric analysis, Measurement.

Tests were conducted on the Laboratory's DLG-6 and DLG-9 boilers, NBTL Projects B-270 and B-271, to determine relations between moisture carryover, boiler water level, steaming rate, and boiler water dissolved solids concentration. Measurements made on the DLG-9 boiler utilized both conductivity and sodium tracer methods. Other tests of modified steam separators in the DLG-9 boiler, and of separators in other boilers at the Laboratory, have been conducted as a part of other related experimental programs. The procedure in conducting moisture tests consisted of steaming the boiler at the particular load of interest, treating the boiler water with NaCl to establish the desired values of total dissolved solids and chloride concentration, and adjusting the boiler drum water level while measuring the concentration of dissolved solids in sampled condensate of the output steam. Three principal methods were used for determining the carryover: conductivity measurement of condensed steam as spectrophotometric measurement of the concentration of sodium ion, and analytical gravimetric analysis of total solids by evaporation to dryness. (Author)

AD-426 714 Div. 27
OTS price $28.50

Martin-Marietta Corp., Denver, Colo.
DEVELOPMENT AND DEMONSTRATION OF MAIN TANK INJECTION (MTI) PRESSURIZATION SYSTEM.
Final rept.,
by R. J. Kenny, P. Freedman, A. P. Lane and P. Bingham. Dec 63, 1v. FTC CR63 23
Contract AF04 611 8198, Proj. 6753, Task 30304
RTD TDR63 1123 Unclassified report

Descriptors: (*Rocket motors (Liquid propellant), Gas generating systems), (*Gas generating system, Design), Hypergolic rocket propellants, Pressure, Specific impulse, Nitrogen compounds, Tetroxides, Diaphragms (Mechanics), Propellant tanks, Fuel tanks, Turbopumps, Materials, Pressure vessels, Test equipment, Combustion products, Combustion chambers, Tests, Fuel injection, Water, Hydrazine, Theory, Thermodynamics, Programming (Computers).

A liquid rocket engine main tank injection (MTI) pressurization system which employs a chemical method of propellant tank pressurization, is studied. The process is initiated by injecting a small quantity of hypergolic reagent into the main propellant tank. The technical approach has been to study the important factors influencing the pressurization process by laboratory experiments and analytically determine system operating characteristics to evaluate various possible designs. Several engineering studies were completed initially to establish the pertinent de-

sign requirements of such a system, identify desirable configurations, and determine the most promising applications. Verification of the theoretical performance and development of a practical system was accomplished by a considerable amount of testing on 5 1/3-cu ft thick wall spherical tanks and subsequent demonstration in a 2,000-gal. full-scale flight-type ground test article. The research fixture was fabricated to investigate the actual reaction process and develop components and operating procedures on a small-scale basis at pressures up to 200 psia. (Author)

AD-426 723 Div. 27, 12
OTS price $2.60

Goodyear Aerospace Corp., Akron, Ohio.
STUDY OF THE EFFECTS OF MECHANICAL DAMAGE ON THE PERFORMANCE OF FILAMENT-WOUND MOTOR CASES.
Progress rept. no. 4, 1 Oct-30 Nov 63, by R. A. Burkley, T. J. Boller, and I. R. Butcher. 20 Dec 63, 20p. Rept. no. GER11154S3
Contract NOw63 0449c
Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Rocket cases), (*Rocket cases, Filament wound construction, Pressure vessels, Performance (Engineering), Second stage motors, Guided missiles (Underwater-to-surface), Surface properties, Failure (Mechanics), Pressure, Stresses, Maintenance, Surface temperature, Shear stresses, Tensile properties, Maintenance equipment.

The planned fabrication, machine flawing, and testing of 18-inch diameter filament-wound bottles is discussed. The objectives of the study program are to study the effects of surface flaws on the performance of Polaris motor cases, to compare the effect of winding sequence on the ability to resist failure from surface flaws, and to determine the reliability of various repair techniques. (Author)

AD-426 728 Div. 27, 12
OTS price $1.00

Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FORCE BALANCE DETERMINATION OF INLET PERFORMANCE FOR ADVANCED VEHICLE APPLICATIONS TO ORBITAL VELOCITIES USING INTERNAL DRAG MEASUREMENTS,
by Paul H. Kutschenreuter, Jr. Sep 63, 23p.
ASD TDR63 701 Unclassified report

Presented at the ASD Science and Engineering Symposium, 18-19 Sep 1963, at Wright-Patterson Air Force Base, Ohio.

Descriptors: (*Air-breathing engines (Unconventional), Ramjet inlets), (*Ramjet inlets, Hypersonic characteristics), Aerospace craft, Supersonic characteristics, Combustion, Hydrogen, Performance (Engineering), Shock wave, Asymmetric bodies, Pressure, Drag, Momentum, Adiabatic gas flow, Configuration, Programming (Computers), Effectiveness, Chemical reactions, Diffusers, Test equipment, Plug nozzles, Errors, Load distribution, Design.

The problem of determining performance levels of supersonic/hypersonic combustion inlet models is presented. Previous approaches to this problem are discussed and a method involving force balance determination of the internal drag is proposed. Results of a computational procedure formulated for calculating inlet performance levels from measured internal drag values are presented. Effects of chemical reactions and exit flow profile nonuniformity are accounted for. Levels of anticipated accuracy, using this technique, are adequate for present applications over a Mach Number range of 8 to 25. (Author)

AD-426 785 Div. 27, 9, 1
OTS price $21.00

General Electric Co., Cincinnati, Ohio.
RESULTS OF WIND TUNNEL TESTS OF A FULL-SCALE, WING-MOUNTED, TIP-TURBINE-DRIVEN LIFT FAN.
Sep 63, 379p.
Contract DA44 177TC584, Task 1D121401D14402
ATRECOM TR63 21 Unclassified report

Descriptors: (*Vertical take-off planes, Shrouded propellers), (*Shrouded propellers, Design), Lift, Fans, Aerodynamic characteristics, Gas turbines, Instrumentation, Model tests, Wind tunnel models, Drag, Ground effect, Performance (Engineering), Equations, Motion, Experimental data, Design, Pressure, Gas flow, Temperature, Velocity, Moments, Pitch (Motion), Thrust, Acceleration, Stresses, Test methods, Thermodynamics.

The full-scale wing-tip turbine-driven lift fan was model tested in the NASA Ames Research Center 40-foot by 80-foot wind tunnel. This series of tests has provided the first large-scale test data with fans installed in wings. Detailed discussions and tabular data are presented on the following: wind tunnel model; test instrumentation, and test procedures and results. Analysis of results considers the basic aircraft performance (power off), fan aerodynamic performance, fan thermodynamic performance, fan powered aircraft performance, fan mechanical performance and hardware inspection. (Author)

AD-426 917 Div. 27,6,1
OTS price $9.10

Oklahoma State U., School of Mechanical Engineering, Stillwater
THE DETECTION OF TURBINE WHEEL TEMPERATURES BY INFRARED RADIATION INSTRUMENTATION.
Final rept.,
by Paul W. Montgomery. 1963, 1v.
Contract AF34 601 14090
Unclassified report

Descriptors: (*Turbojet engines, Instrumentation), (*Turbine wheels, Temperature warning systems), (*Radiation pyrometers, Temperature warning system), Infrared detectors, Temperature, Failure (Mechanics), Tensile properties, Life expectancy, Design, Tests, Test equipment, Cooling, Pressure, Emissivity, Captive tests, Magnetic amplifiers, Pyrometers.

Progress made in the investigation of the total radiation pyrometer as a means of detecting turbine wheel temperature in the J-47 and allied turbojet engines is presented. The investigation definitely proved that a total radiation pyrometer can be used as a means of detecting turbine temperature. Also, a magnetic amplifier system can be used to activate an alarm light or audible alarm device when the pyrometer output corresponds to a preset temperature level. All of the major instrumentation components are available commercially, and the electronic system can easily be adapted to military specifications and 400 cycle power. (Author)

Division 27 - PROPULSION SYSTEMS

AD-426 920 Div. 27, 30
OTS price $12.50

Aerojet-General Corp., Sacramento, Calif.
QUALIFICATION TEST REPORT FOR STATHAM ABSOLUTE PRESSURE TRANSDUCER. WEAPON SYSTEM 133A.
Final rept.,
by R. W. Armstrong. 27 Dec 63, 1v. Rept. no. 0162 01DR26
Contract AF33 600 36610 Unclassified report

Descriptors: (*Transducers, Pressure), Performance (Engineering), Tests, Captive tests, Guided missiles (Surface to surface), Rocket motors (Solid propellant), Acceleration, Reliability, Safety, Vibration, Temperature, Humidity, Moistureproofing, Radiofrequency interference.

Results of qualification tests conducted on absolute pressure transducer Model PA334TC-2.5M are described. Transducers SN 447, 487, 491, 493, and 703 were subjected to performance, frequency response, motor static firing, and safety reliability tests. Remainder of the qualification tests including vibration, acceleration, temperature-altitude, altitude, humidity, hermetic seal, radio-frequency interference, and performance reliability were performed on transducer Model PA334TC-750 and are considered applicable to Model PA334TC-2.5M based on the similarity of the two parts. (Author)

AD-426 973 Div. 27, 25
OTS price $3.60

Stanford Research Inst., Menlo Park, Calif.
THE ROLE OF ALUMINUM AND ITS OXIDES AS SOURCES OR MODERATORS OF ELECTRONS IN SOLID PROPELLANT ROCKET EXHAUSTS.
Annual rept., 1 July 62-30 June 63,
by G. Neil Spokes. 30 June 63, 31p.
Contract AF04 694 128, SRI Proj. PAU4134, pt. 2 Unclassified report

Descriptors: (*Rocket motors (Solid propellant), Exhaust gases), (*Exhaust gases, Electron density), Tests, Alkali metals, Sodium, Potassium, Ionization, Particles, Aluminum compounds, Oxides, Electrons, Theory, Exhaust flames, Plasma medium, Photoelectric effect, Electrical properties, Optical properties, Test equipment, Electrical conductance, Microwaves.

Five theoretical approaches to an understanding of gas-particle plasmas are outlined. Laboratory experiments have been made on the microwave properties of gas-particle plasmas. Observed ionization can be accounted for in terms of alkali metal impurity ionization. Photoelectric and electron paramagentic resonance studies of alpha- and gamma-alumina particles indicated that spin centers in the particles may be the cause of previously observed photoelectric effect radiation with 1849 A. Studies indicate that aluminum oxide with lattice defects may have a work function of 3.7 eV. The literature values for the A1203 band gap as determined by electrical conduction are not well understood. Pure single crystal alumina probably has a large band gap in consequence of which the defect-free alumina work function may be higher than 4.38 eV. Excess aluminum and lattice defects in particles of alumina in rocket exhausts may give a particle work function of 3.72 eV. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-426 514 Div. 28
OTS price $1.60

Ohio State U. Research Foundation, Columbus.
PERSONALITY FACTORS IN MOTIVATION.
Final rept.,
by Julian B. Rotter. 2 Dec 63, 16p. Rept. 1007
Contract AF49 638 741, Proj. 9778, Task 37708
AFOSR J1371 Unclassified report

Descriptors: (*Motivation, Personality), (*Personality, Motivation), Behavior, Learning, Social communication, Adjustment (Psychology), Sociology, Attitudes, Theory, Social sciences, Ecology.

This investigation is concerned with two general areas of study. One has to do with the general conditions which make for a perception of external control, chance, fate, etc., and the conditions which lead the individual to seek reinforcements as contingent upon himself. In this area we are also interested in the characteristics of the individual's behavior or changes in him as a result of such a perception, as well as the conditions which produce such a perception. Information obtained along these lines could be of crucial importance in learning theory and in studies of the more complex behavior of man in general. Such knowledge would have wide application in the fields of training, pedagogy, and social behavior. The second broad area of investigation is the area of individual differences. Given the same situation one individual may interpret what happens to him as determined by luck or fate, and another may interpret it as a result of his own actions. Individual differences in such preception might have significant effects on the person's behavior. It might have important implications for problems of efficiency of learning, social behavior, adjustment and psychotherapy, social attitudes, and all interpersonal behavior. In social learning theory the construct of internal vs. external control of reinforcement is regarded as a generalized expectancy, operating across a large number of situations, which relates to whether or not the individual does or does not have control over what happens to him. In sociology alienation can be regarded as a related conception. (Author)

AD-426 694 Div. 28
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THOUGHTS AT A DISTANCE,
by M. Kantorovich. 3 Dec 63, 5p.
FTD TT63 1035 Unclassified report

Trans. from Sovetskaya Rossiya (Russian), p. 4, 28 Aug 63.

Descriptors: (*Parapsychology, Communication systems), (*Brain, Parapsychology), Physiology, Psychology, Scientific research.

AD-426 768 Div. 28, 23
OTS price $6.60

Texas Christian U., Fort Worth.
PREDICTION OF AIR FORCE ADAPTABILITY OF BASIC AIRMEN REFERRED FOR PSYCHIATRIC EVALUATION,
by S. B. Sells and Douglas J. Mace. Sep 63, 60p.
Contract AF41 657 411, Proj. 7719, Task 771902
PRL TDR63 23 Unclassified report

Descriptors: (*Adjustment (Psychology), Aviation personnel), (*Adjustment (Psychology), Mathematical prediction), (*Aviation personnel, Performance tests), Air Force, Psychometrics, Tables, Analysis.

About 4000 basic airmen are referred to the Mental Hygiene Clinic each year. Less than one-fourth of these complete successful enlistment terms. In this study, data from enlistment records, basic training, and clinic referral were collected and analyzed to identify predictors of success within this psychiatric referral group. Keying 24 items from clinical records resulted in scores which correlated .55 with the criterion of Air Force success. Regression equations were derived to show increased efficiency of prediction from adding the mental hygiene data to other predictors of success. Distributions of the mental hygiene scores illustrate possible use of a cutting score for early identification of mental hygiene referrals not likely to successfully complete an Air Force tour. (Author)

AD-426 837 Div. 28
OTS price $2.75

Behavioral SCIENCES Lab., AOERONAUTICAL Systems Div., Wright-Patterson Air Force Base, Ohio.
WALKING RESPONSES UNDER LUNAR AND LOW GRAVITY CONDITIONS,
by James F. Roberts. Nov 63, 117p.
Proj. 7184, Task 718 405
AMRL TDR63 112 Unclassified report

Report on Human Performance in Advanced Systems. Master's thesis.

Descriptors: (*Exercise, Lunar environment), Theory, Gravity (Artificial), Performance tests, Behavior, Analysis, Instrumentation, Motion, Shear stresses, Muscles.

Previous walking studies are reviewed to determine methods of investigation. A description of normal walking is included for definition and as a basis for comparison of the low gravity gait. Walking behavior can be analyzed by motion methods or by force methods. Motion analysis is sufficient to quantitatively describe the low gravity gait, but a force analysis is needed to establish the reasons for the degradation of the walk. The construction of a force-measuring walkway is proposed, but was not completed. Alternatively, a motion picture (time-displacement) walking experiment was conducted at various artificial gravity levels in an aircraft flying parabolic trajectories. Two subjects walked fore and aft on a floor-marked distance scale. Successive lowering of the gravity level from 1.0 g to 0.1 g produced the following effects. The subjects maintained within 10 percent of their normal 1-g velocity to gravity levels of 0.25 g or below. The most consistent effect of the reduction of gravity was the increased swinging time of the leg, which varied inversely as the sixth root of the gravity level. (Author)

AD-426 842 Div. 28, 32
OTS price $1.10

California U., Los Angeles.
DYNAMICS OF SOCIAL INFLUENCE.
Annual rept. no. 5, Dec 62-Dec 63,
by Bertram H. Raven. Dec 63, 8p.
Contract Nonr23354, Proj. NR171 350
Unclassified report

Descriptors: (*Group dynamics, Public relation), Social communication, Behavior, Attitudes, Parapsychology, Perception.

AD-426 928 Div. 28
OTS price $3.60

Educational Testing Service, Princeton, N. J.
RESPONSE SET SCORES AS PREDICTORS OF PERFORMANCE,
by Norman Frederiksen. Nov 63, 29p. Rept. no. RB63 31
Contract Nonr233800, Proj. NR151 182
Unclassified report

Descriptors: (*Performance tests, Measurement), (*Psychometrics, Analysis), Government employees, Theory, Aptitude tests, Job analysis.

A Work Preference Schedule (SPS), containing items concerned with preferences for a variety of job attributes, was administered to federal government employees in connection with routine personnel procedures. Answer sheets were obtained and rescored to yield scores which would presumably reflect social desirability and extremity response sets. Statistical study of the scores showed that response sets could be reliably measured and that attractive and unattractive items should be studied separately. Correlations of set scores with biographical data and with scores from inventories and tests were computed, including scores from a situational test, the Bureau of Business In-Basket Test. It was judged that the only correlations that were capable of reasonably unambiguous interpretation were those between in-basket scores and desirability set scores obtained from unattractive items. The results show that those who try to put themselves in a good light in responding to the VPS are likely to follow leads suggested by their superior in the in-basket situation and to show generally good performance both in terms of quantity and quality. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-426 735 Div. 29
OTS price $5.60

Naval Supply Research and Development Facility, Bayonne, N. J.
DEVELOPMENT OF FOOD STORAGE CONTAINERS FOR USE ON A2G AIRCRAFT,
by G. A. Pollak and H. Brey. July 63, 1v.
NSRDF 1 Unclassified report

Descriptors: (*Food, Storage), Containers, Food dispensing, Design, Naval aircraft, Temperature, Materials, Storage tubes, Beverages, Frozen foods, Electrical networks.

To provide a means of carrying food aboard A2F aircraft, semirigid food storage containers with a zippered closure were developed. One set of food storage containers consists of an insulated food storage container for carrying and storing chilled foods, and an electrically heated food storage container for carrying and storing hot foods. The set of food storage containers can be stored aboard the aircraft in a portion of the map case assembly made available for this purpose. Each food storage container has a capacity of six collapsible aluminum tubes -- each tube used for storage of 5 ounces of semi-solid food or six plastic squeeze bottles -- each bottle used for storage of 5 ounces of beverage or any combination of six tubes and bottles. When the insulated food container was filled with five foods or beverages prechilled to 39 F., plus one beverage frozen to act as a latent heat sink, the prechilled foods and

beverages rose to a temperature of 54 F. and the frozen beverages rose to a temperature of 34 F. in 6 hours. In the heated food storage container, preheated foods and beverages attained an equilibrium temperature of 137 F.; foods and beverages at about 75 F. required about 2-1/2 hours to attain a serving temperature of about 120 F. Recommendations were made for providing a larger access opening, a handle, and improved insulation in the food containers. (Author)

AD-426 891 Div. 29
OTS price $2.60

Army Natick Labs., Mass.
BEHAVIOR OF LIQUIDS ON VARIOUS CORDS FOR SEAMS OF CHEMICAL AND BIOLOGICAL PROTECTIVE OVERGARMENTS,
by Pauline P. Hall. Oct 63, 22p.
ANL TS127 Unclassified report

Descriptors: (*Liquids, Penetration), (*Protective clothing, Effectiveness), Theory, Clothing, Protective coverings, Tests.

Previous researchers have reported the behavior of liquid migration on and through textile assemblies. This study is the first known attempt to test seams for liquid penetration by various chemicals (important for developing chemical and biological protective overgarments) and to develop an LSc type seam with a superimposed cord to help resist this penetration. The results show that liquid behavior on seams differs among chemicals as well as among cords. The optimum protection for a seam may vary from one chemical to another. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-426 693 Div. 30, 16
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PORTRAIT OF AN ELECTRONIC 'PHYSICIAN',
by V. Kovalev. 3 Dec 63, 5p.
FTD TT63 1031 Unclassified report

Trans. from Komsomol'skaya Pravda (Russian), p4, 3 Aug 63.

Descriptors: (*Computers, Medical personnel), (*Diagnosis, Computers), Physiology, Bionics, Monitors, Electronic equipment, Cybernetics.

AD-426 699 Div. 30
OTS price $4.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
CALIBRATION OF THE HYPERVELOCITY IMPULSE TUNNEL,
by J. A. Copper and F. J. Hameetman. Oct 63, 43p. Rept. SM43060
Unclassified report

Descriptors: (*Hypersonic wind tunnels, Calibration), Measurement, Pressure, Velocity, Aerodynamic characteristics, Reynolds number, Heat transfer, Wind tunnel nozzles, Thermodynamics, Enthalpy, Chemical equilibrium, Reliability, Test methods.

The Hypervelocity Impulse Tunnel (HIT) is a versatile, high-performance shock tunnel located at the Douglas Aerophysics Laboratory (DAL). This shock tunnel uses the tailored-interface and equilibrium-interface techniques to provide test durations of at least 10 milli-seconds. These test durations are sufficiently long to enable forces and pressures as well as heat-transfer rates to be measured. Results of the calibration of the test section of the HIT are presented. Flow uniformity and repeatability, inviscid core size, the effects of reservoir pressure, reservoir enthalpy level, and test-section axial location are discussed. Pressure and heat transfer distributions on simple bodies have been measured at nominal Mach numbers of 9 and 23, respectively. These investigations are interpreted according to appropriate aero-thermodynamic theory and compared with data from other facilities. (Author)

AD-426 726 Div. 30, 17
OTS price $1.10

Naval Research Lab., Washington, D. C.
ULTRASONIC INSPECTION OF TUNGSTEN ROUND ROBIN BILLETS, PHASE IV,
by Louis C. Cardinal and Stephen D. Hart.
30 Dec 63, 6p.
Proj. 62R05 19B
NRL TM243 Unclassified report

Descriptors: (*Tungsten, Nondestructive testing), (*Nondestructive testing, Ultrasonic radiation), (*Ultrasonic radiation, Nondestructive testing), Test methods, Porous metals, Impregnation, Silver.

AD-426 897 Div. 30, 8
OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RECIRCULATER WITH QUANTIZATION,
by V. A. Fel'dman. 12 Dec 63, 7p.
FTD TT63 981 Unclassified report

Trans. from Izvestiya Vysshikh Uchebnykh Zavedeniy Radiotekhnika, No. 2, pp. 197-199, 1963.

Descriptors: (*Delay lines, Computer storage devices), Pulse analyzers, Input-output devices, Magnetic core storage.

A recirculator with unlimited memory time and memorizing the arriving rectangular signals with an accuracy up to a certain value, called quantum is discussed. (Author)

AD-426 910 Div. 30, 8, 2
OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
PRESSURE TRANSDUCER FOR MEASURING SHOCK WAVE PROFILES.
Final rept.,
by D. D. Keough. 1 Nov 63, 45p.
Contract DA49 146XZ096, SRI Proj. PGU3713
DASA 1414 Unclassified report

Descriptors: (*Piezoelectric gages, Design), Pressure gages, Transducers, Shock waves, Seismic waves, Rock, Soils, Measurement, Meters, Wire, Lithium alloys, Magnesium alloys, Manufacturing methods, Piezoelectric transducers.

The development is reported of a piezoresistive gage capable of recording multikilobar shock pressure profiles in soils and rocks. Specifically, a gage or system of gages is required which will respond to pressures from 10 kb upward, with a rise time of the order of 0.01 micro sec and a recording duration as long as possible, 50 micro sec or greater is desired. Initial effort con-

sisted of two concurrent phases, an investigation of piezoresistive and insulating materials, and a gage development program. As these phases progressed, it became of primary importance to obtain suitable insulating media. The principal effort has been the selection of insulators, determination of their electrical and Hugoniot characteristics, and subsequent utilization in the design and construction of gages. Possible fundamental investigations of the piezoresistive effect in conductors has been subordinated in preference to achieving an insulator-piezoresistive wire configuration of characteristics as clearly defined as shock wave theory and experimentation permit. Accordingly, a system can be provided for both future piezoresistive studies and gage development work. Particular attention has been given to peripheral, but necessary, gage systems tests, such as wire hysteresis effects, extraneous insulator pressure-induced signals (polarization, conductivity changes), electrical lead geometry and materials, and shock heating. (Author)

AD-426 985 Div. 30, 26
OTS price $9.60

Mitre Corp., Bedford, Mass.
FIRST CONGRESS ON THE INFORMATION SYSTEM SCIENCES SESSION 7. INFORMATION SYSTEM SIMULATION AND MODELLING TECHNIQUES.
Dec 63, 108p. Rept. no. SS7
Contract AF33 600 39852, Proj. 704
ESD TDR63 474 7 Unclassified report

Descriptors: (*Data processing systems, Simulation), (*Behavior, Simulation), Computers, Group dynamics, Language, Social communication, Automatic, Decision making, Theory, Military organizations, Job analysis, Management engineering.

The Leviathan project is a unique, experimental approach to studying the structure and social dynamics of large-scale organizations such as a military command, a government bureau, or an industrial organization. It involves creation of an artificial society in a computerized laboratory, combining live subjects who enact managerial roles with artificial agents which implement policy decisions. Three simulations are discussed in this paper: an automatic-mode simulation, a live simulation, and a dual-mode simulation. The automatic mode simulation (June 1961) demonstrated the feasibility of operating a complex technological system on a large modern computer. The live simulation (April 1962) demonstrated the practicality of operating this system in a computerized laboratory with live executives. The live subjects were required to communicate through the computer which recorded all interactions. The dual-mode simulation would combine live subjects and artificial agents. (Author)

AD-426 993 Div. 30, 2, 16, 12, 27, 10
OTS price $3.60

Office of Naval Research, San Francisco, Calif.
RESEARCH RESERVE SPACE SCIENCE SEMINAR: SUMMARY OF PRESENTATIONS.
1963, 26p.
Unclassified report

Descriptors: (*Space flight, Scientific research), (*Symposia, Space flight), Naval research, Astronautics, Astronomy, Aerobiology, Closed-cycle ecological system, Extraterrestrial bases, Telemetering data, Spacecraft, Physiology, Lasers.

AD-426 999 Div. 30, 8
OTS price $2.60

Towson Labs., Inc., Md.
DEVELOPMENT AND FABRICATION OF A PROTOTYPE AIRBORNE AND GROUND ENCODING SYSTEM.
Final rept.,
by C. Barbour. 13 Jan 64, 21p.
Contract DA36 034ORD3443, Proj. 1G2 50206D241
Unclassified report

Descriptors: (*Analog-to-digital converters, Airborne), (*Switching circuits, Analog-to-digital converters), Electronic switches, Transistors, Computer logic, Coding, Power supplies, Programming (Computers).

The development and fabrication of an airborne analog-to-digital converter and a ground based analog to digital converter is described. Both units utilize charge transfer circuits to accomplish the conversion of an analog voltage to a train of pulses which represents a digital number. In the airborne converter, the serial train of pulses is converted into an NRZ format, and this waveform is the digital output. In the ground based converter, the serial train of pulses is fed to a shift register, from which the digital output may be obtained either in serial NRZ or in parallel form. Also, the ground based converter is reversible, which is to say that a serial train of pulses representing a digital number can be converted into an analog voltage in addition to the function of the analog-to-digital conversion. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-426 536 Div. 31
OTS price $6.60

Naval Ordnance Test Station, China Lake, Calif.
SWIMMING HINGED HYDROFOILS,
by Howard R. Kelly and Glenn H. Bowlus. Dec 63, 66p.
NOTS TP3342; NAVWEPS 8411 Unclassified report

Descriptors: (*Hydrofoils, Swimming), (*Oscillation, Hydrofoils), (*Hydrodynamics, Hydrofoils), (*Propulsion, Oscillation), Lift, Drag, Model tests, Drives, Mathematical analysis, Model basins.

Lift, drag, and power input were measured on three configurations of a small, symmetrical hydrofoil that was mechanically oscillated in a two-dimensional water flow. The tests included oscillations of different amplitudes in combined heaving and pitching of the rigid, single-hinged, and double-hinged hydrofoils, and simple oscillations (waving) of the hinged hydrofoils with one point fixed. The drag coefficients (positive and negative) are compared with Wu's theory of swimming hydrofoils. The Wu theory can successfully predict the thrust of an oscillating hydrofoil, whether it is rigid or hinged. (Author)

AD-426 706 Div. 31, 2
OTS price $3.60

Webb Inst. of Architecture, Glen Cove, N. Y.
LECTURE NOTES ON SHIP MOTION IN IRREGULAR SEAS,
by Edward V. Lewis and Rutger Bennet. Oct 63, 34p.
Grant Nonr G0005 63
Unclassified report

Descriptors: (*Ships, Motion), Pitch (Motion), Oceans, Acceleration, Harmonic analysis, Energy, Measurement, Tests, Ship models.

Two papers are presented. The first is The Superposition Principle Applied to the Prediction of Ship Behavior. An outline is given of the procedure usually followed in predicting the response of a ship to an irregular storm sea on the basis of the superposition of its responses to all the components which make up that sea. A non-dimensional form of presentation is then developed which makes it possible to visualize and interpret the results of comparative calculations for different ships. The second paper is Acceleration due to Vertical Motions of a Ship. The vertical acceleration of a point in a ship subject to pitching and heaving motions is considered by combining vectorially the pitching and heaving accelerations. A method of estimating the expected extreme values in irregular seas is then presented and compared with full-scale ship data. (Author)

AD-426 757 Div. 31
OTS price $2.60

David Taylor Model Basin, Washington, D. C.
PERFORMANCE OF WAKE-ADAPTED PROPELLERS IN OPEN-WATER AND PROPULSION CONDITIONS AS DETERMINED BY THEORY AND EXPERIMENT,
by John L. Beveridge. Nov 63, 20p.
Proj. S R009 01 01
DTMB 1777 Unclassified report

Descriptors: (*Propellers (Marine), Effectiveness), Design, Wake, Theory, Experimental data, Loading (Mechanics), Model tests, Bodies of revolution, Thrust, Torque, Performance (Engineering).

Important considerations and concepts concerned with determining propeller performance in open-water and propulsion (behind-body) conditions are discussed. Two wake-adapted propellers were designed by the Eckhardt-Morgan method using Lerbs' theory of moderately loaded propellers. Performance of these propellers in open-water and wake-adapted conditions was calculated by the Burrill method. For examples of a submerged body of revolution and a single-screw surface ship, relative rotative efficiencies, as obtained by theory and model experiment, are shown to be in good agreement. (Author)

AD-426 782 Div. 31
OTS price $11.00

Army Transportation Research Command, Fort Eustis, Va.
LIGHTER, BEACH DISCHARGE, DECK CARGO, DIESEL, STEEL, 300-FOOT, DESIGN 5002,
by Emmett G. Hundley. Sep 63, 135p.
Task 9R57 02 018 01
ATRECOM TR63 57 Unclassified report

Descriptors: (*Landing craft, Cargo ships), (*Cargo ships, Landing craft), Performance (Engineering), Amphibious operations, Model tests, Vibration, Motion, Propellers (Marine), Beaches.

The design, construction, and testing of a pilot model of a beach discharge lighter is reported. The item was developed to fulfill a requirement for a shallow-draft, self-propelled lighter to transport large quantities of mobile and/or outsized equipment to a beach for resupply in ship-to-shore operations. The lighter was to have a capacity far surpassing that of existing available craft, to be capable of loading and discharging on a beach by means of a ramp, to be highly maneuverable, and to be capable of rapid retraction from a beach. The ultimate objective of the project was to type classify the item for the Transportation Corps Marine Fleet. The project included the testing of a 25-ft model to determine the feasibility of a vessel of the type proposed. It also included the development of four concepts of vessel design and propulsion, the evaluation of the concepts, and a self-propelled test-model test of the selected design concept. The problem of integrating the lighter with roll-on/roll-off ocean vessels was studied during the model testing by estimating the motion of the vessels and the forces involved. Mooring arrangements and devices were developed. (Author)

AD-426 929 Div. 31, 9
OTS price $17.50

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
THE HYDRODYNAMICS AND STABILITY & CONTROL TANDEM PROPELLER SUBMARINE. PHASE II.
Final rept.,
by E. Schroeder and W. Wilson. Aug 63, 1v.
CAL rept. no. AG1634V3
Contract Nonr365900, Proj. NR062 284
Unclassified report

Descriptors: (*Submarines, Propellers (Marine)), (*Propellers (Marine), Hydrodynamic configurations), (*Hydrodynamics, Propellers (Marine)), Shrouded propellers, Control, Stability, Theory, Propeller blades, Simulation, Handling, Control systems.

Hydrodynamic and stability and control characteristics are investigated for a novel submarine configuration employing tandem, large hub-to-tip diameter ratio propellers, the blades of which can be pitched both collectively and cyclicly. Earlier analyses, using combined blade element and momentum theory to describe the forces and moments produced by the propellers, are refined and extended to include the effect of cyclic pitch on propeller-induced inflow. A preliminary analysis of shrouded propeller hydrodynamics is included. Stability and control is investigated for Tandem Propeller Submarine (TPS) operation over the forward speed range from 0 to 40 ft/sec with both propellers thrusting. Low-speed operation is also investigated with one propeller thrusting and one counter-thrusting. Automatic control techniques for improving the stability and control characteristics of the TPS are presented. (Author)

AD-426 935 Div. 31, 28
OTS price $15.00

Minneapolis-Honeywell Regulator Co., Minn.
STABILITY AND MANUAL CONTROLLABILITY OF THE TANDEM PROPELLER SUBMARINE.
Final rept., Phase 2,
ed. by R. C. McLane. 7 Oct 63, 173p.
Contract Nonr367500
Unclassified report

Descriptors: (*Submarines, Control systems), (*Control simulators, Underwater propulsion), Submarine simulators, Operators (Personnel), Display systems, Simulation, Analog systems, Stability, Real time, Control sticks, Human engineering, Propellers (Marine).

Manual controllability of a six-degree-of-freedom vehicle was investigated. Study, analysis, and experimental testing were used to demonstrate controllability and to determine requirements

for control inputs, information display, and control coupling (and decoupling) when the vehicle is a tandem-propeller submarine. A control station mockup, including a six-degree-of-freedom input control and a contact analog display (with quickened perspective tracking symbol), was combined with an analog computer simulation of a tandem-propeller submarine to provide real-time tests of controllability performance using naive male subjects. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-426 508 Div. 32
OTS price $22.25

RAND Corp., Santa Monica, Calif.
REAL WAGES IN SOVIET RUSSIA SINCE 1928,
by Janet G. Chapman. Oct 63, 395p. Rept. no. R371PR
Unclassified report

Descriptors: (*Wages, Economics), (*Economics, Wages), Theory, Social science, Costs, Money, Indexes, Commerce, Labor, Population, War potential.

This volume is one of a series of studies that RAND has been conducting on different facets of the Soviet economic-military potential. Because the Soviet government has published information on the cost of living and real wages only during favorable periods, there has been a crucial gap in our knowledge of the Soviet worker's standard of living. Grounded on the economic theory of index numbers, and drawing heavily on a number of earlier RAND studies, this Report presents the first detailed and fully documented Western study of nonagricultural real wages in the Soviet Union from the eve of the first Five Year Plan in 1928 to the present. (Author)

AD-426 538 Div. 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
VARIETIES OF ECONOMIC SECRECY IN THE SOVIET UNION,
by Leon Herman. Dec 63, 28p. Rept. no. P2840
Unclassified report

Descriptors: (*Documentation, Social sciences), Statistical data, Social sciences, Scientific research, Economics.

AD-426 654 Div. 32, 26, 15
OTS price $1.60

Purdue U., School of Industrial Engineering and Management, Lafayette, Ind.
NOTES ON THE EXISTENCE OF UTILITY FUNCTIONS,
by Hugo Sonnenschein. Dec 63, 7p. Institute Paper no. 63
Contract Nonr110016, Proj. NR047 026
Unclassified report

Descriptors: (*Economics, Mathematical analysis), (*Management engineering, Analysis), Topology.

AD-426 671 Div. 32
OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LABOR (SELECTED ARTICLES).
5 Dec 63, 15p.
FTD TT63 1045 Unclassified report

Trans. from Trud, pp. 1 and 2, 12 Apr 62.

Descriptors: (*Space flight), (*Astronautics), Astronauts, Space navigation, Space medical, Spacecraft, Astronomy, Solar radiation, Training.

AD-426 679 Div. 32
OTS price $5.60

Office of Aerospace Research, Washington, D. C.
PROCEEDINGS OAR PUBLICATIONS CONFERENCE, WASHINGTON, D. C., 20-24 MAY 1963.
1963, 1v.
OAR 17 Unclassified report

Descriptors: (*Documentation, Symposia), Military publications.

OAR publications should seek to accomplish the basic OAR objective of bringing about the impact of science on Air Force technology on a timely and continuing basis. Therefore, OAR must be responsible not only for the conduct and support of research, but also for the dissemination of research results to meet Air Force needs. Publication in scientific journals is preferable; information not appropriate for journals should be published in technical reports. Technical reports should be of same quality as comparable articles in the learned journals. Manuscripts awaiting journal publication should be re-examined within nine months to ascertain if they should by published as in-house reports. OAR must reserve the right to use and reproduce its sponsored papers and reports. Review publications are a legitimate basic research function and justify the use of PB 680 funds. They should be directed primarily toward the needs of the Air Force in-house exploratory research. Primary distribution should be kept to a minimum. Manuscripts should not be formally distributed; however, they should be promptly announced, and if appropriate, may be circulated as working papers to meet Air Force needs. (Author)

AD-426 700 Div. 32
OTS price $1.10

Aerospace Corp., Los Angeles, Calif.
PROFESSIONAL PAPERS CLEARED FOR POSSIBLE PUBLICATION AND/OR PRESENTATION 16 NOVEMBER 1963 THROUGH 15 DECEMBER 1963,
by Frances A. Brady. 31 Dec 63, 2p. Rept. no. CSR269 9990PP6
Contract AF04 695 269
Unclassified report

Descriptors: (*Bibliographies, Space flight), Physics, Fluid dynamic properties, Solid state physics, Petroleum, Turbulence, Physical chemistry, Oscillation.

AD-426 709 Div. 32, 30
OTS price $7.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
UNCLASSIFIED PUBLICATIONS OF LINCOLN LABORATORY SUPPLEMENT 3.

15 Sep 63, 70p. Pub. no. L356
Contract AF19 628 500
Unclassified report

Descriptors: (*Scientific research, Bibliographies), (*Physics laboratories, Scientific research), Indexes, Solid state physics, Re-entry vehicles, Radar equipment, Physics, Engineering, Electronics, Data processing systems, Digital systems, Astrophysics.

AD-426 886 Div. 32
OTS price $7.60

California U., Berkeley, Center for Research in Management Science.
DECENTRALIZED PROCEDURES FOR PLANNING,
by E. Malinvaud. Nov 63, 69p. TR15
Contract Nonr22277, Proj. NR047 029
Unclassified report

Descriptors: (*Management engineering, Optimization), (*Production, Optimization), Operations research, Industrial production, Economics, Industrial research, Game theory, Stochastic processes, Control, Dynamic programming, Linear programming.

The ideas presented in this paper were prompted by certain methodological questions arising in connection with French long-term planning. The discussion has direct relevance for the exchange of information that occurs between the Commissariat du Plan and the large public enterprises when the former prepares the national plan and the latter determines their long term programs. The problems which may be posed in defining the collective choices to be made are not considered. The study is as relevant for authoritatively planned societies as for liberal societies in which planning complements and orients the market mechanism. In all cases, long-term plans should be so determined that they specify as accurately as possible the most favorable development option available to the country. Discussion is restricted to cover operations on goods and services only. All difficulties are eliminated by using a model which does not include time as a variable. It is assumed that the central planning bureau operates with a complete, unaggregated list of commodities. The five parts include: some general principles for the study of decentralized procedures, implications of the procedures covered by earlier theoretical research, two new specific procedures, and suggestions as to what is, in my view, the line to be followed by future research on the subject. (Author)

AD-426 906 Div. 32
OTS price $15.50

RAND Corp., Santa Monica, Calif.
ECONOMIC VIABILITY AFTER THERMONUCLEAR WAR: THE LIMITS OF FEASIBLE PRODUCTION,
by Sidney G. Winter, Jr. Sep 63, 224p. Rept. no. RM3436PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Nuclear warfare, Survival), Economics, Population, Agriculture, Industries, Industrial production.

Preparedness measures that would enhance the short-run survival prospects of the population in the event of a thermonuclear war are of no value if the war would so cripple the nation's economic system that the survivors could not be supported in the long run. This Memorandum treats certain aspects of the question of how, and under what circumstances, the resources that would survive such a war could be used to create an economy capable of supporting the population, maintaining its capital stock, and meeting any other national needs of comparable urgency. The main focus is on the limits imposed on production in the postattack economy by the availability of economic resources and the technological conditions of production. (Author)

AD-426 922 Div. 32
OTS price $6.60

RAND Corp., Santa Monica, Calif.
AGGREGATE PRODUCTION FUNCTIONS AND MEDIUM-RANGE GROWTH PROJECTIONS,
by Richard R. Nelson. Dec 63, 58p. RM3912PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Economics, Models (Simulation)), Growth, Labor, Production, Analysis, Quality control, Mathematical analysis.

This Memorandum is an analysis and comparison of the implications of several different but related aggregative models of long-run economic growth. These models differ somewhat in both their explanations of past economic growth and their projections of future growth. The analysis begins by examining the variables and relationships stressed by the various models, and the different explanations of the 1929-1960 growth record that these models provide. A general aggregative production function is developed which includes the various models as special cases. The role of growth of the labor supply, of capital formation, of technological advance, and of rising educational standards is examined within the framework of the models. Finally, the study examines a number of growth projections for the American economy, attempts to evaluate them within the framework provided by the general model, and suggests some of the major uncertainties involved in growth projections. One of the major conclusions of the study is that projections of U.S. growth over the next decade are extremely sensitive to the economic model used in making those projections, and in particular to the assumed rates of growth of capital stock and total factor productivity. (Author)

AD-426 923 Div. 32
OTS price $2.60

RAND Corp., Santa Monica, Calif.
INTERNATIONAL DIVISION OF LABOR IN CEMA: LIMITED REGRET STRATEGY,
by Egon Neuberger. Dec 63, 17p. RM3954PR
Contract AF49 638 700
Unclassified report

Descriptors: (*Economics, Theory), (*Labor, Analysis), Political science, Commerce, Communists, Decision making.

This RAND Memorandum assesses the path chosen by the member countries of the Council of Economic Mutual Assistance (CEMA) toward achieving an international socialist division of labor. Conflicting objectives; political, economic, and ideological constraints; and the lack of a satisfactory theory of division of labor in East and West prevent an optimum solution whether judged by the criteria of Western economic theory or by bjectives of CEMA leaders. This Memorandum argues that the strategy followed by CEMA members is one ''limited regret,'' a conservative policy based on risk aversion. This strategy consists of attempts to obtain some of the bene-

fits of a division of labor while avoiding risks of large losses; CEMA countries are able to reap the benefits of comparative advantage in those cases where these benefits appear obvious, and gain from economies of scale in other cases. In view of the serious impediments to the achievement of a more effective division of labor, the relatively small steps taken thus far in CEMA seem to be sensible ones. (Author)

AD-426 925 Div. 32
OTS price $21.00

Planning Research Corp., Los Angeles, Calif.
CIVIL DEFENSE IMPLICATIONS OF CURRENT AND FUTURE URBAN CONFIGURATIONS,
by H. R. Woltman and E. C. Goodrow. 20 Dec 63, 343p. Rept. no. R409
Contract OCD OS62 278

Unclassified report

Descriptors: (*Civil defense systems, Urban areas), Population, Growth, Vulnerability, Density, Buildings.

This report examines the possibilities of vulnerability reduction through long-term changes in urban form and structure, in the light of projected trends in economic and social forces affecting future urban development. Urban decentralization is likely to continue in the future, and technological change may permit deliberate acceleration of this trend toward sprawling urban regions. Various conceptual and empirical urban forms are reducible to a few basic types. The vulnerability characteristics of the different forms are mixed, but the galaxy and dispersed sheet forms are generally best suited to civil defense purposes. These are similar to the forms that future urban regions are expected to take. A variant of the dispersed sheet form is considered the most advantageous; it would provide compact urban communities, separated by extensive open spaces devoted to nonurban land uses, within future metropolitan areas. In addition, efforts to increase the 'hardness' of urban structures are desirable. An increased proportion of high-hardness structural types should be encouraged in the building mix. This increase should take the form mainly of high-hardness residential structures dispersed singly or in clusters throughout residential areas. Indirect methods are considered by which progress toward these objectives might be assisted through various ongoing Federal and state governmental activities. (Author)

33. TRANSPORTATION

AD-426 780 Div. 33
OTS price $4.60

Institute of Transportation and Traffic Engineering U. of Calif., Berkeley.
AN INVESTIGATION OF THREE COMBINATIONS OF INTENSITIES AND SPACINGS OF THE U.S. NATIONAL STANDARD FOR RUNWAY TOUCHDOWN ZONE AND CENTERLINE LIGHTING.
Interim rept. no. 2,
by H. G. Paula, G. Ahlborn, W. E. Gillfillan, R. Horonjeff and D. M. Finch. May 63, 45p.
Contract ARDS434

Unclassified report

Descriptors: (*Landing lights, Runways), (*Runways, Landing lights), Landing fields, Airplane landings, Visibility, Fog, Effectiveness, Test facilities, Intensity, Lighting equipment, Landing aids.

AD-426 921 Div. 33
OTS price $6.60

Federal Aviation Agency, Washington, D. C.
MEASUREMENT OF THE NATIONAL AIRSPACE SYSTEM.
Jan 64, 60p.
Proj. 151 002

Unclassified report

Descriptors: (*Aeronautics, Measurement), Air traffic, Airports, Aircraft, Test facilities, Costs, Navigation, Aviation personnel, Personnel, Commerce, Flight, Aviation accidents, Standards, Design.

This report contains a limited description of the present FAA system for measurement of the National Airspace System. It suggests that measures of operational effectiveness be added to the present system to provide inputs for cost/benefit studies and to assist top management in decision making functions. (Author)

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OTS $3.60

DESCRIPTORS: *Military publications, *Indexes, Bibliographies, *Radar, Infrared detectors, Guidance, Detection, Lasers.

The primary purpose of this list is to provide AD numbers for the convenience of persons wishing to order a particular document. (Author)

ASTRONOMY

Astrophysics

NASA-TN-D-2100
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
DUST BOMBARDMENT ON THE LUNAR SURFACE
Curtis W. McCracken and Maurice Dubin. (National Aeronautics and Space Administration). Dec 63, 25p
N64-11906
OTS $0.75

Presented at the Lunar Surface Materials Conference, Boston, Massachusetts, May 21-23, 1963.

N63-21906
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE MANMADE RADIATION BELTS
Wilmont N. Hess. [1963] 41p
Technical memo X-50561
OTS $4.60

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International Union of Theoretical and Applied Mechanics.
PROBLEMS OF COSMICAL AERODYNAMICS. PROCEEDINGS OF THE SYMPOSIUM ON THE MOTION OF GASEOUS MASSES OF COSMICAL DIMENSIONS HELD IN PARIS, AUGUST 16-19, 1949
J. H. Oort, B. Stromgren, L. Spitzer, Jr. and others. 1951, 248p. In cooperation with International Astronomical Union, and United Nations Educational, Scientific and Cultural Organizations ATI-103 347
OTS $16.00

DESCRIPTORS: *Conferences, *Space environmental conditions, *Astrophysics, *Aerodynamics, Gas flow, *Gases, Interstellar matter, Shock waves, Galaxies, Motion, *Solar atmosphere, *Geophysics

N64-13273
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARS ATMOSPHERE ENTRY PARAMETRIC STUDY
J. M. Brayshaw. 31 Oct 63, 109p
Contract NAS7-100
Technical rept. no. 32-458, rev. 1; NASA CR-53020
OTS $9.10

N64-13282
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE SOLAR-WIND VELOCITY AND ITS CORRELATION WITH COSMIC-RAY VARIATIONS AND WITH SOLAR AND GEOMAGNETIC ACTIVITY
Conway W. Snyder, Marcia Neugebaur, and U. R. Rao (Mass. Inst. of Tech.) 15 Oct 63, 19p
Contract NAS7-100; Contract AT(30-1)2098
Technical rept. no. 32-514; NASA CR-53027
OTS $1.60

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ASTRORELATIVITY
Helmut G. L. Krause. Jan 64, 63p
N64-12155
OTS $1.75

BEHAVIORAL SCIENCES

Human Engineering

PB-165 056
[Aerospace Medical Research Labs. (6570th)] Wright-Patterson AFB, Ohio.
SIZE OF TABS: A FACTOR IN HANDLING OF GUIDES AND CHECK-LISTS. Rept. on Human Factors in Advanced Flight
David W. Rees and William N. Kama. Mar 59, 23p
WADC Technical rept. 59-158; AD-213 595
OTS $2.60

DESCRIPTORS: *Indexes, Design, *Maintenance, *Maintenance personnel, *Aircraft equipment, Air force equipment.

The design of index tabs, as used on check-lists to facilitate handling, was investigated. The experiment was designed to investigate the performance of subjects in locating particular sections within check-lists as a function of tab size. The interactions of tab size with degree of subject encumbrance and tab position were also investigated. The results support the following design conclusions: (1) provision of tabs along the left margin of a check-list significantly improves facility-of-access to information within the check-list; and (2) facility-of-access improves with increase in tab dimensions up to at least the 3/4 x 3/4 inch size. (Author)

PB-165 054
General Dynamics/Convair, San Diego, Calif.
DESIGNER'S CHECKLIST FOR IMPROVING MAINTAINABILITY. Final rept., 1 Mar 60-1 May 61, on Human Performance in Advanced Systems
Leroy D. Pigg. Feb 62, 42p
Contract AF33(616)6924
ASD-TDR-62-45
OTS $4.60

DESCRIPTORS: *Indexes, *Maintenance, Design, *Display systems, Control panels, *Aircraft equipment, Maintenance personnel, Air force equipment

Results of review of many sources of information on maintainability design are presented in checklist form for use by designers. "Do's" and "Don'ts" for designers are arranged in twelve general design categories which are, in turn, cross-referenced to specific design applications. (Author)

NASA-TN-D-2036
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
A FIXED-BASE VISUAL-SIMULATOR STUDY OF PILOT CONTROL OF ORBITAL DOCKING OF ATTITUDE-STABILIZED VEHICLES
Donald R. Riley and William T. Suit. Jan 64, 46p
N64-12715
OTS $1.25

NASA-TN-D-2229
Stanford Univ., Calif.
DESIGN AND EVALUATION OF A PREDICTOR FOR REMOTE CONTROL SYSTEMS OPERATING WITH SIGNAL TRANSMISSION DELAYS
John E. Arnold and Paul W. Braisted. Dec 63, 114p
Grant NsG-111-61
N64-11993
OTS $2.50

Personnel and Training

PB-165 079
[Air Force Personnel and Training] Research Center, Lackland AFB, Tex.
ACQUISITION OF SKILL ON THE RUDDER CONTROL TEST WITH VARIOUS FORMS OF SOCIAL COMPETITION
Edward A. Bilodeau. Jul 51, 9p
Research note P&MS 51-5; ATI-168 875
OTS $1.10

DESCRIPTORS: *Training, *Learning, *Group dynamics, Psychometrics, Aerial rudders, Analysis of variance,

Social competition was systematically varied in order to isolate some of its possible effects on acquisition of skill. It was manipulated by testing either one or two subjects in the same room; under conditions in which (1) some subjects are tested in pairs early in practice, but alone later in practice; (2) others were tested alone in initial practice, but paired in later practice; and (3) other subjects were tested either alone or in pairs throughout practice. Further, a test for the effects of this variable was made with both a short and a long rest period between an initial and final period of continuous practice. Whether subjects practiced alone or with a partner during initial, intermediate, or final practice (regardless of the social conditions of prior practice), no differences in performance were evident. This was also true whether the interpolated rest was of long or short duration. The difference between groups having a short interpolated rest and those with a longer rest was the only effect of the experimental treatments.

BIOLOGICAL SCIENCES

TID-18466
Arizona Univ., Tucson.
A VIRUS INHIBITOR FROM TOBACCO
Milton Zaitlin and Albert Siegel. 20 Jul 62, 14p
Contract AT(11-9)873
OTS $1.60

AD-407 018 repriced
California Univ., Los Angeles. School of Medicine.
EFFECTS OF DECEREBRATION AND DECORTICATION ON SHIVERING IN THE CAT
D. G. Stuart, W. J. Freeman, and A. Hemingway. Sep 62, 20p
Contract AF41(657)344
AAL-TDR-62-15; N63-17347
OTS $0.50

DESCRIPTORS: *Shivering, Excision, Brain, *Cerebral cortex, *Hypothermia, Oxygen consumption, Motor reactions,

The effects of decerebration and decortication on the metabolic intensity of shivering in cats were determined. There was neither shivering nor an appreciable rise in the oxygen consumption rate of chronic decerebrate cats during rapid cooling. The intermittent somatomotor activity that was induced by rapid cooling was occasionally tremulous but it was also evoked by rapid warming and was absent during slow cooling and warming. This suggested that the motor activity of decerebrate cats during rapid cooling was more a generalized avoidance response to nociceptive stimulation than a temperature regulating mechanism. In decorticate cats shivering was depressed three days after surgery, the mean shivering to nonshivering ratio in oxygen consumption rate being 1.6 ± 0.12 (S.D.), while the same ratio before operation was 2.6 ± 0.48 (S.D.). One month after decortication shivering had returned to its preoperative intensity. This suggested that the net telencephalic influences on shivering could hardly be suppressive, as suggested by some earlier investigators. (Author)

Biochemistry

BNL-6013
Brookhaven National Lab., Upton, N. Y.
ON THE STRUCTURE OF SPERM WHALE MYOGLOBIN. II. THE TRYPTIC HYDROLYSIS OF THE DENATURED PROTEIN
A. B. Edmundson (Rockefeller Inst.) and C. H. W. Hirs. 23 Apr 62, 56p
Contract AT(30-2)GEN-16
OTS $5.60

N64-11801
FMC Corp., Princeton, N. J.
A STUDY OF THE FEASIBILITY OF THE REGENERATION OF CARBOHYDRATES IN A CLOSED CIRCUIT RESPIRATORY SYSTEM. Final rept.
G. C. Akerlof and P. W. D. Mitchell. 1 Mar 63, 197p
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OTS $13.50

TID-18539
South Carolina Medical Coll., Charleston.
RELATIONSHIPS BETWEEN THE INCREASED PLASMA VISCOSITY SEEN IN ACIDOSIS AND OTHER BIOCHEMICAL CONDITIONS 3 May 63, 10p
Contract AT(40-1)2947
OTS $1.10

Botany

BNL-6078
Brookhaven National Lab., Upton, N. Y.
GENETIC CONTROL OF NICOTIANA PLANT TUMORS
Harold H. Smith. 19 Jun 62, 12p
Contract AT(30-2)GEN-16
OTS $1.60

BNL-6150
Brookhaven National Lab., Upton, N. Y.
MEASUREMENTS OF PLANT CARBON DIOXIDE EXCHANGE BY INFRA-RED ABSORPTION UNDER CONTROLLED CONDITIONS AND IN THE FIELD
Philippe F. Bourdeau and George M. Woodwell. 19 Jun 62, 18p Prepared in cooperation with Yale Univ. School of Forestry
Contract AT(30-2)GEN-16
OTS $1.60

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Brookhaven National Lab., Upton, N. Y.
TUMOR INDUCTION BY AN IAA-KINETIN INTERACTION IN A NICOTIANA HYBRID. 19 Jun 62, 6p
Contract AT(30-2)GEN-16
OTS $1.10

Medical Specialties and Equipment

BNL-5746
Brookhaven National Lab., Upton, N. Y.
ELECTRODE SYSTEM FOR SERIAL ELECTROCARDIOGRAPHIC TRACINGS
S. Fine, W. Wolins, J. S. Robertson, and L. E. Farr. 16 Jan 62, 7p
Contract AT(30-2)GEN-16
OTS $1.10

AD-278 893
Combat Development Group, Army Medical Service, Washington, D. C.
ARMY AEROMEDICAL EVACUATION. Final rept. Dec 59, 57p
CDOG Proj. no. AMSCD 56-6
OTS $5.60

DESCRIPTORS: *Military medicine, *Army operations, *Casualties, Transport planes, Ambulances, Wounds and injuries,

This study accomplished the following objectives: (1) Review and evaluate current doctrine, procedures, and techniques for aeromedical evacuation support of joint operations, infantry, armored, unilateral airborne and amphibious operations, and operations involving logistical support by army transport aviation; (2) Collect and evaluate experience data relative to current doctrinal, organizational and operational concepts of aeromedical support; (3) Develop additional or new doctrine, techniques, and procedures for aeromedical support during the time frame 1960-1965 considering the general operational, organizational and materiel objectives stated in the Combat Development Objectives Guide; and (4) Develop future qualitative and quantitative army aeromedical evacuation requirements, by type, for the time frame 1960-1965. (Author)

PB-165 142
School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF AQUEOUS STANNOUS FLUORIDE ON ENAMEL SOLUBILITY
Ira L. Shannon, Warren R. Hester, Elmer F. Belli, and John R. Blankenship. May 62, 11p
SAM-TDR-62-63
OTS $1.60

DESCRIPTORS: *Teeth, Diseases, *Dental caries, Lactic acid, *Tin compounds, *Fluorides, *Phosphorus, Chemical analysis

Aqueous solutions of stannous fluoride were evaluated as agents for reducing lactic acid decalcification of human dental enamel. Performance was measured by the amount of phosphorus removed from enamel before and after fluoride treatment. Phosphorus was determined automatically on the AutoAnalyzer. SnF_2 solutions of 5.0, 10.0, and 20.0 percent concentration were significantly more effective than 0.4, 0.7, and 1.0 percent solutions. Aqueous preparations of stannous fluoride maintained their protective potency throughout the 12-week experimental period. (Author)

Microbiology

BNL-6091
Brookhaven National Lab., Upton, N. Y.
A NEW CHLOROPHYLL FROM GREEN BACTERIA.
19 Jun 62, 8p
Contract AT(30-2)GEN-16
OTS $1.10

UCRL-10966
Lawrence Radiation Lab., Univ. of California, Berkeley.
SULFATE REDUCTION BY BACTERIA
Mark Leban and Charles R. Wilke. 28 Aug 63, 90p
Contract W7405-eng-48
OTS $2.00

Radiobiology

TID-19266
Atomic Energy Commission, Washington, D. C. Div. of Biology and Medicine.
IODINE-131 IN FRESH MILK AND HUMAN THYROIDS FOLLOWING A SINGLE DEPOSITION OF NUCLEAR TEST FALLOUT
H. A. Knapp. 1 Jun 63, 103p
OTS $3.50

BNL-6113
Brookhaven National Lab., Upton, N. Y.
CELL POPULATION STUDIES ON THE INTESTINE OF CONTINUOUSLY IRRADIATED RATS
Doris R. Wimber and Leonard F. Lamerton. 19 Jun 62, 20p
Contract AT(30-2)GEN-16
OTS $1.60

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POSITRON SCANNER FOR LOCATING BRAIN TUMORS
S. Rankowitz, J. S. Robertson, W. A. Higinbotham, and M. J. Rosenblum. 18 Jun 62, 18p
Contract AT(30-2)GEN-16
OTS $1.60

BNL-6165
Brookhaven National Lab., Upton, N. Y.
THE SOMATIC MUTATION THEORY OF AGING: ITS APPLICATION IN IRRADIATED AND NON-IRRADIATED LIVERS OF MICE
Cathyrn Crowley and H. J. Curtis. 19 Jun 62, 12p
Contract AT(30-2)GEN-16
OTS $1.60

UCSF-23
California Univ., San Francisco. School of Medicine.
RADIOLOGICAL LABORATORY. Annual progress rept. for period ending 30 Sep 63. Nov 63, 56p
Contract AT(11-1)GEN-10
OTS $1.50

UCRL-11033
Lawrence Radiation Lab., Univ. of California, Berkeley.
BIOLOGY AND MEDICINE: SPRING 1963. Semiannual rept.
John H. Lawrence and Tove Neville, ed. 156p
Contract W7405-eng-48
OTS $2.75

TID-18422
Rochester Univ., N. Y.
SOME ASPECTS OF CALCIUM METABOLISM IN X-IRRADIATED RABBITS
Robert E. Milani. Master's thesis. 1954, 70p
Contract W7405-eng-49
OTS $6.60

CHEMISTRY

IS-742
Ames Lab., Iowa State Univ. of Science and Tech.
THE CATION EFFECT ON ACID-BASE REACTIONS IN FUSED ALKALI NITRATES
James Alfred Luthy and F. R. Duke. Aug 63, 45p
Contract W7405-eng-82
OTS $1.25

IS-678
Ames Lab., Iowa State Univ. of Science and Tech.
THE CRYSTAL STRUCTURE OF SODIUM HYDROGEN FLUORIDE
James Edward Benson and D. R. Fitzwater. May 63, 62p
Contract W7405-eng-82
OTS $1.50

IS-385
Ames Lab., Iowa State Univ. of Science and Tech.
THE REACTIONS OF SOME NIOBIUM(V) HALIDES WITH PYRIDINE
R. E. McCarley, B. G. Hughes, J. C. Boatman, and B. A. Torp. Jun 62, 37p
Contract W7405-eng-82
OTS $3.60

IS-598
Ames Lab., Iowa State Univ. of Science and Tech.
RELAXATION PHENOMENA IN THE ELECTRICAL DOUBLE-LAYER
Daniel Harrison Grantham and Robert S. Hansen.
Nov 62, 100p
Contract W7405-eng-82
OTS $2.25

TID-15858
Argonne National Lab., Ill.
PARAMAGNETIC RESONANCE AND CHEMICAL BONDING IN CUPRIC (II) AND ARGENTIC (II) PYRIDINE MON- AND DICARBOXYLATES
G. Mila De La Roca and J. A. McMillan. Apr 62, 8p
Contract W31-109-eng-38
UAC-6332
OTS $1.10

TID-15898
Argonne National Lab., Ill.
PARAMAGNETIC RESONANCE OF PHOTOLYZED SOLID HYDROGEN PEROXIDE
J. A. McMillan and B. Smaller. Apr 62, 20p
Contract W31-109-eng-38
UAC-6356
OTS $1.60

BNL-6161
Brookhaven National Lab., Upton, N. Y.
FREE RADICALS FORMED ON U.V. IRRADIATION OF o-NITROBENZAIDEHYDE. 19 Jun 62, 8p
Contract AT(30-2)GEN-16
OTS $1.10

BNL-6099
Brookhaven National Lab., Upton, N. Y.
THE SOLVENT EXTRACTION OF THORIUM BY THENOYLTRIFLUOROACETONE AND THE INFLUENCE OF AQUEOUS COMPLEXATION BY THE CHELATING AGENT
Leonard Newman and Paul Klotz. 23 Apr 62, 15p
Contract AT(30-2)GEN-16
OTS $1.60

BNL-6059
Brookhaven National Lab., Upton, N. Y.
THE STANDARD MOLAR FREE ENERGY OF FORMATION OF $MgCl_2$, $CeCl_3$, $ThCl_4$, AND UCl_3 OBTAINED BY SOLID STATE EMF TECHNIQUES
J. J. Egan, W. McCoy (Youngstown Univ.), and J. Bracker. 19 Jun 62, 19p
Contract AT(30-2)GEN-16
OTS $1.60

BNL-6141
Brookhaven National Lab., Upton, N. Y.
SYNERGISTIC EFFECT OF TRI-N-OCTYLAMINE ON THE SOLVENT EXTRACTION OF THORIUM BY THBNOYLTRIFLOOROACETONE
Leonard Newman and Paul Klotz. 26 Apr 62, 23p
Contract AT(30-2)BEN-16
OTS $2.60

PB-165 064
Buffalo Univ., N. Y.
THE PREPARATION OF MONO-AND DI-SUBSTITUTION PRODUCTS OF TRICHLORO-S-TRIAZINE BY REPLACEMENT OF CHLORINE BY TRIALKYLSILYLPHENYL. Rept. for Jun 59-Sep 60, on Nonmetallic and Composite Materials
Howard W. Post and Clarence J. Murphy. Apr 61, 21p
Contract AF33(616)6480
WADD Technical rept. 60-737, Part I
OTS $2.60

DESCRIPTORS: *Triazines, *Silanes, Chlorides, Bromides, Phenyl radicals, Methyl radicals, Tolyl radicals, Allyl radicals, Benzyl radicals, Vinyl radicals, Pentyl radicals, Synthesis (Chemistry)

Unsuccessful attempts were made to prepare 2,4-diphenyl-6-(trimethylsilylmethyl)-s-triazine and 2-chloro-4,6-bis-(trimethylsilylmethyl)-s-triazine. The following new triazines have been prepared: 2,4-dichloro-6-(p-trimethylsilylphenyl)-s-triazine and 2,4-dichloro-6-(p-tolyl)-s-triazine. Also, the following new compounds have been prepared as possible intermediates for other triazines: allyldimethyl-p-bromophenylsilane, benzyldimethyl-p-bromophenylsilane, vinyldimethyl-p-bromophenylsilane, and amyldimethyl-p-bromophenylsilane. (Author)

TID-16282
Kansas Univ., Lawrence.
REACTION LAYER CONCEPT APPLIED TO ROTATING DISK ELECTRODES
Z. Galus and Ralph N. Adams. 20 Feb 63, 5p
Contract AT(11-1)686
OTS $1.10

TID-13561
Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
DIFFERENTIAL THERMAL ANALYSIS OF THE CRYSTALLINE TRANSITIONS OF LOW-TEMPERATURE CUBIC AND HEXAGONAL SILVER IODINE
Edward M. Barrall (California Research Corp.) and L. B. Rogers (Purdue Univ.) 25 Aug 61, 11p
Contract AT(30-1)905
OTS $1.10

TID-15923
Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
ION-EXCHANGE IN CONCENTRATED ELECTROLYTE SOLUTIONS: III THE SYSTEM: PYRIDINE HYDROCHLORIDE-NaCl-DOWEX-50
Walter A. Platek. 18 Jun 62, 17p
OTS $1.60

TID-15433
Laboratory for Nuclear Science, Mass. Inst. of Tech., Cambridge.
SPECTRAL ABSORPTION STUDIES IN THE 8-QUINOLINOL FAMILY
O. Popovych and L. B. Rogers. 18 Apr 62, 25p
OTS $2.60

UCRL-10904
Lawrence Radiation Lab., Univ. of California, Berkeley.
MUTUAL CHARGE NEUTRALIZATION OF GASEOUS IONS
James Carl Person. Thesis. 11 Jul 63, 145p
Contract W7405-eng-48
OTS $2.50

LAMS-2988
Los Alamos Scientific Lab., N. Mex.
THE DIFFERENTIAL THERMAL ANALYSIS UNIT AT GROUP GMX-3
Stanley V. Dubiel, Jr. and John F. Baytos. 31 May 63, 59p
Contract W7405-eng-36
OTS $1.50

LA-2987
Los Alamos Scientific Lab., N. Mex.
HARTREE SCATTERING FACTORS FOR ELEMENTS 2 THROUGH 98 AND FOR SEVERAL IONS
Don T. Cromer, Allen C. Larson, and James T. Waber. 9 Oct 63, 95p
Contract W7405-eng-36
OTS $2.00

TID-16295
National Lead Co. of Ohio, Cincinnati.
THE EFFECTS OF VARIOUS GRADES OF GRAPHITE ELECTRODES ON THE CARRIER DISTILLATION OF IMPURITIES IN U_3O_8
C. E. Pepper, A. J. Pardi, and M. G. Atwell. 1961, 40p
Contract AT(30-1)1156
OTS $3.60

PB-165 098
New York Univ., N. Y. Coll. of Engineering.
RESEARCH ON THE PREPARATION OF PURE METALS (LITERATURE SEARCH ON SELECTED METAL HYDRIDES). Scientific rept. no. 1, 16 Jun-14 Sep 58
Walter Brenner and Charles J. Marsel. [1958] 116p
Contract AF19(604)4124
AFCRC-TN-58-561; AD-160 870
OTS $9.60

DESCRIPTORS: *Aluminum compounds, *Antimony compounds, *Barium compounds, *Beryllium compounds, *Bismuth compounds, *Boron compounds, *Gallium compounds, *Lead compounds, *Lithium compounds, *Magnesium compounds, *Strontium compounds, *Tin compounds, *Hydrides, Preparation, *Bibliographies,

272 annotated references

TID-7015
Oak Ridge National Lab., Tenn.
INDEXES TO THE OAK RIDGE NATIONAL LABORATORY MASTER ANALYTICAL MANULA (1953-1962)
Helen P. Raaen and Ann S. Klein, ed. [1963] 136p
Contract W7405-eng-26
OTS $2.50

TID-15724
Sandia Corp., Albuquerque, N. Mex.
APPROACHES TO MASS-SPECTROMETER GAS ANALYSIS USING PHOTOGRAPHIC-PLATE ION DETECTION
J. W. Guthrie. 28 May 62, 11p
Contract AT(29-1)789
SCDC-2575
OTS $1.60

TID-16180
Savannah River Lab., Aiken, S. C.
PREPARATION OF A STANDARD CHROMIUM(III) SOLUTION BY CONTROLLED-POTENTIAL COULOMETRY
D. E. Harrington, R. C. Propst, and R. D. Britt, Jr. 16 Jul 62, 3p
Contract AT(07-2)1
OTS $1.10

TID-18482
Vanderbilt Univ., Nashville, Tenn.
REFLECTIVITY OF SOLUTIONS
James Cothran Everett, Jr. Master's thesis. Aug 62, 41p
OTS $4.60

Physical Chemistry

PB-165 071
Amherst Coll., Mass.
MATHEMATICAL THEORY OF THE FARADAIC ADMITTANCE (PSEUDO-CAPACITY AND POLARIZATION RESISTANCE). Technical rept. no. 8
David C. Grahame. 2 Jun 52, 53p
Contract N8onr-66903
ATI-171 463
OTS $5.60

DESCRIPTORS: *Electrochemistry, Theory, *Polarographic analysis, *Electrical double layer, Fused materials, Electrolytes, Resistance (Electrical), Electrical impedance,

The impedance (or admittance) of a metal-solution interface is influenced by electrochemical processes which permit the flow of direct current. The magnitude of the effect is calculated without the use of assumptions of doubtful validity. The effect can be represented as an admittance in parallel with the electrical double layer. This admittance, in turn, can be represented as a series combination of impedances. These impedances with one exception, can not be expressed in their dependence upon frequency as a finite combination of ordinary resistors, capacitors and inductors. Their values and frequency dependence are deduced by setting up and solving the appropriate differential equations. It is found that the dispersion of the capacity and resistance usually observed with solid metals in contact with inert salt solutions is attributable to a lack of smoothness, after more obvious sources of error have been eliminated.

PB-160 919-1
Monsanto [Research Corp.] Everett, Mass.
FUEL CELLS. Quarterly progress rept. no. 1, 1 Oct-31 Dec 59
J. O. Smith, F. B. Leitz, Jr., and F. R. Sampson.
31 Jan 60, 61p
Contract DA44-009-eng-4154
OTS $6.60

DESCRIPTORS: *Fuel cells, *Electrodes, Fuels, Electrolytes, Hydrocarbons, *Hydrazines, *Platinum catalysts, *Electrochemistry, Bibliographies.

The investigation is a feasibility study on low-temperature fuel cells using hydrocarbons and related compounds as fuels. Apparatus was developed and constructed which allows study of the fuel electrode, here considered the most productive area for study, independent of the remainder of the cell. Data are presented which indicate the influence of fuel concentration, electrolyte concentration, and cell temperature on the output of the cell. Preliminary data on hydrazine are included which indicate that hydrazine with a platinized catalyst may be of commercial interest. (Author)

PB-165 033
Pennsylvania State Univ., University Park.
ATTEMPTED PREPARATION OF SODIUM HYDRIDE IN COORDINATION SOLVENTS
F. N. Daugherty and W. C. Fernelius. 14 Jan 57, 20p
Contract NOas-52-1024c
Rept. no CCC-1024-TR-220; AD-126 772
OTS $1.60

DESCRIPTORS: *Sodium compounds, *Hydrides, Synthesis (Chemistry), *Glycols, Ethers, *Propenes, Oxides, Sodium alloys, Potassium alloys, Amides, Separation, Ammonium,

Sodium-potassium alloy dissolves to a considerable extent in triethylene and tetraethylene glycol dimethyl ethers and propylene oxide cyclic tetramer as evidenced by the formation of deep blue solutions. Subsequent to the color development in these solutions, a reaction between the solvent and the dissolved metal occurs. Under the conditions employed, these solutions did not take up hydrogen to form sodium hydride. The separation of sodium hydride from sodium amide was attempted by extractions with liquid ammonia, in view of the possible production of sodium hydride from the reaction of sodium amide, and systems containing sodium amide, with hydrogen. A separation was not accomplished in this manner. (Author)

AD-290 318
Stanford Research Inst., Menlo Park, Calif.
THE KINETICS OF DECOMPOSITION OF LIQUID AMMONIUM NITRATE. II. DECOMPOSITION OF NH_4NO_3 CATALYZED BY CHROMIUM COMPOUNDS
Willis A. Rosser, S. Henry Inami, and Henry Wise.
[1962] 23p
Contract Nonr-3415(00)
[SRI Proj. no. PU-3573]
OTS $2.60

DESCRIPTORS: *Solid rocket propellants, *Ammonium compounds, *Nitrates, Degradation, Reaction kinetics, *Chromium catalysts

The effect of chromium compounds on the decomposition of liquid NH_4NO_3 has been studied in the temperature range from 460 to 520°K. Chromium compounds soluble in liquid NH_4NO_3 were found to be effective catalysts. For low concentrations of catalyst, the principal products of decomposition are N_2, N_2O, H_2O, and HNO_3. The catalyzed decomposition, like the uncatalyzed decomposition, is inhibited by NH_3 and H_2O, and promoted by HNO_3. (Author)

EARTH SCIENCES

UCRL-6894
Lawrence Radiation Lab., Univ. of California, Livermore.
THE THERMAL CONDUCTIVITY OF ROCK SALT
D. R. Stephens and A. Maimoni. 1 May 62, 16p
Contract W7405-eng-48
OTS $1.60

PB-165 097
Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
ANARCTIC RESEARCH AND DATA ANALYSIS. ANALYSIS OF Q INDICES IN THE ANARCTIC DURING THE INTERNATIONAL GEOPHYSICAL YEAR.
Scientific rept. no. 6
Gerald F. Rourke. 1 Jun 63, 52p
Contract NSF-C255
Technical rept. RAD-TR-63-23
OTS $5.60

DESCRIPTORS: *Antarctic regions, *Terrestrial magnetism, *Geophysics, Aurorae, Atmospherics, Periodic variations, Harmonic analysis, Data,

The Q index at three Antarctic stations during the International Geophysical Year is examined. The monthly diurnal and yearly variation is discussed and harmonically analyzed for disturbed, quiet, and all days. Maximums of magnetic activity are discussed in connection with the direction and position of ionospheric current systems. In winter, Macquarie Island and Mawson are characterized as auroral zone stations with a postmidnight maximum while Mirny shows very slight disturbance in the horizontal components. In summer, Macquarie Island and Mawson are characteristic of the Stagg transition zone with two maximums of disturbance activity while Mirny displays a single midday maximum. (Author)

Climatology and Meteorology

NASA-TN-D-2137
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
AN ANALYSIS OF ERRORS IN THE GEOGRAPHIC REFERENCING OF NIMBUS CLOUD PICTURES
Eugene M. Darling, Jr. Jan 64, 27p
N64-12878
OTS $0.75

PB-165 095
National Severe Storms Project, Kansas City, Mo.
A SUMMARY OF FIELD OPERATIONS AND DATA COLLECTED BY THE NATIONAL SEVERE STORMS PROJECT IN SPRING 1961
Jean T. Lee. Mar 62, 51p
Rept. no. 5; N62-12188
OTS $5.60

DESCRIPTORS: *Storms, *Thunderstorms, *Meteorological phenomena, Scientific research, Weather stations, Meteorological instruments, Research planes, Meteorological data, Weather forecasting, Meteorology,

The objectives of the Project were as follows: (1) to investigate the structure and evolution of those parameters of cyclonic-scale distrubances which are responsible for the outbreak of severe convection, (2) to examine and describe the detailed structures of mesoscale and convective-scale systems so as to understand the mechanisms underlying the growth, movement, and dissipation of squall lines and severe weather cells, (3) to study the distribution and intensity of severe convective byproducts (tornadoes, hail, turbulence, lightning, icing, surface gusts) relative to the cloud mass, (4) to develop a qualitative and quantitative classification of convective storms by means of ground-based and air-borne radar; (5) to study the energy budget of severe convective storms; and (6) eventually, to look into the feasibility of cloud modification methods which may apply to lessening the effects of severe convection. A listing of the data gathered, its form, and its availability is presented. (Author)

Physics of the Atmosphere

N63-21975
Geophysics Corp. of America, Bedford, Mass.
A DC PROBE FOR ROCKET MEASUREMENTS IN THE IONOSPHERE
L. G. Smith. Jun 63, 59p
Contract NASw-98
GCA Technical rept. no. 63-19-N; NASA CR-51506
OTS $5.60

NASA-TN-D-2092
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ELECTRICITY IN THE TERRESTRIAL ATMOSPHERE ABOVE THE EXCHANGE LAYER
Elden C. Whipple, Jr. Jan 64, 24p
N64-12960
OTS $0.75

Presented at the third Intern. Conf. on Atmospheric and Space Elec., Montreux, Switzerland, May 6-10, 1963

N64-13374
Southwest Center for Advanced Studies, Dallas, Tex.
ATMOSPHERIC TIDES AND ASSOCIATED MAGNETIC EFFECTS
J. A. Fejer. 11 Oct 63, 68p
Grant NsG-269-62
NASA-CR-55160
OTS $6.60

PB-165 070
Space Physics Research Lab., Univ. of Michigan, Ann Arbor.
ELECTROSTATIC PROBE MEASUREMENTS OF THE IONOSPHERE. Scientific rept. no. GS-1
R. L. Boggess. Nov 59, 150p
Contracts DA20-018-509-ORD-103, AF19(604)1843, and AF19(604)6124
2521, 2816-1, and 03484-1-S; AFCRC-TN-59-654; AD-230 793; N63-17606
OTS $11.00

DESCRIPTORS: *Ionosphere, Physical properties, Measurement, *Sounding rockets, Instrumentation, Electronic equipment, Design, *Electrodes, *Electrostatics, *Gas ionization.

A rocket-borne adaptation of a Langmuir probe was used to measure the properties of the E-layer of the ionosphere. The design was considered an exploratory experiment which would provide a basis for future ionospheric probes. Equal importance was placed on establishing the reasonableness of the theoretical treatment and determining ionospheric parameters. In anticipation of the use of spherical electrodes, the general probe theory is reviewed emphasizing a spherical geometry. Additional spherical approximate current-voltage relations are derived and the criteria for using 2 special solutions, a sheath-area-limited or an orbital-motion-limited solution, are determined. Since a fixed reference potential is not available in the ionosphere, a multiple electrode system must be used. Several designs are considered, and one particular bipolar design, two 6-in. spheres separated by a 10-in.-long, 2-1/4-in.-diam cylinder, was chosen. In this particular design the spheres were split and the outer hemispheres acted as information electrodes. The inner hemispheres acted as guard electrodes. The equal-area 2-electrode probe causes the least disturbance of the plasma being measured. (Author)

ENGINEERING

PB-181 595
Bureau of Yards and Docks, Washington, D. C.
ENGINEER'S MANUAL. Engineered Performance Standards, Public Works Maintenance. Sep 63, 174p.
NAVDOCKS-P-700.0, supersedes Engineer's Manual, NAVDOCKS-P-700, May 58, Change 1, Oct 60, Change 2, Dec 60, and Change 3, Feb 61.
ORD $3.00

DESCRIPTORS: *Job analysis, Naval shore establishments, Maintenance, Standards, *Instruction manuals

The publication presents the procedures for the development of Engineered Performance Standards, their installation at Naval activities, and the methods of conducting supplementary activity studies using the work sampling technique. (Author)

HW-SA-2433
Hanford Atomic Products Operation, Richland, Wash.
THE APPLICATION TO A UO_3 CALCINER FURNACE OF A CLOSED LOOP CONTROL SYSTEM DEVELOPED USING SIMULATION TECHNIQUES
C. E. Huck. 9 Apr 62, 31p
Contract AT(45-1)1350
OTS $3.60

LA-2901
Los Alamos Scientific Lab., N. Mex.
PRESTRESSED CONCRETE SPHERICAL CONTAINMENT VESSEL
D. W. Mueller and A. P. Furnish. 1 May 63, 64p
Contract W7405-eng-36
OTS $1.50

N64-11813
National Aeronautics and Space Administration, Washington, D. C.
NASA'S QUALITY PROGRAM
Howard M. Weiss. [1962] 23p
NASA TM X-51276
OTS $2.60

Presented at Joint Meeting of Boston Sections of the Institute of Radio Engineers (RGRQS) and the Society for Nondestructive Testing, October 18, 1962.

K-1568
Oak Ridge Gaseous Diffusion Plant, Tenn.
A SINGLE STAGE AXIAL COMPRESSOR BLADE TEST FACILITY
G. G. Fee. 13 Jan 64, 47p
Contract W7405-eng-26
OTS $1.25

SCTM-203-62(25)
Sandia Corp., Albuquerque, N. Mex.
AN IMPROVED TEST METHOD FOR DETERMINING THE EFFECTS OF REPLACING INDEPENDENT-RESPONSE COMPONENTS IN A SYSTEM
W. D. Raburn. Sep 62, 10p
Contract AT(29-1)789
OTS $1.10

TID-16297
Sandia Corp., Albuquerque, N. Mex.
AN IONIZED GAS JET SURFACE CLEANER
G. L. Krieger. 23 Jul 62, 19p
Contract AT(29-1)789
SCDC-2534
OTS $1.60

SCTM-258-62(71)
Sandia Corp., Albuquerque, N. Mex.
A MATHEMATICAL CALIBRATION PROCEDURE FOR WIND-TUNNEL FORCE BALANCES
G. M. Connell. Nov 62, 16p
Contract AT(29-1)789
OTS $1.60

TID-15801
Sandia Corp., Albuquerque, N. Mex.
A METHOD OF DETERMINING SPALL THRESHOLDS USING ONE-DIMENSIONAL SHOCK WAVES
C. D. Lundergan and J. H. Smith. 14 May 62, 22p
Contract AT(29-1)789
SCDC-2629X
OTS $2.60

DP-843
Savannah River Lab., Aiken, S. C.
STATIC AND IMPACT TESTS ON 15-TON CASK FOR SHIPPING IRRADIATED FUEL
W. I. Thisell and J. W. Langhaar (E. I. du Pont de Nemours, and Co.) Aug 63, 153p
Contract AT(07-2)1
OTS $2.75

NYO-9742
Worthington Corp., Newark, N. J.
HIGH PRESSURE PUMP SEAL DEVELOPMENT.
Engineering quarterly progress rept. Dec 61-Feb 62.
Paul J. Zanoni. 5 Mar 62, 14p
Contract AT(30-1)2682
OTS $1.60

Aeronautical Engineering

PB-165 052
Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
BIBLIOGRAPHY OF SUPER-SONIC TRANSPORT CANDIDATE METALS
Don Ingels and George Young. 20 Apr 62, 162p
Technical memo. ASRCE TM-62-7; N62-16256
OTS $12.00

DESCRIPTORS: *Bibliographies, *Metallography, Metals, Alloys, Supersonic planes, *Aircraft materials.
270 refs
The bibliography includes ASD technical reports, reports prepared by other DOD agencies, and some unpublished reports from aerospace manufacturers. Abstracts of all reports listed have been included as part of the bibliography.

PB-165 060
Air Force Flight Test Center, Edwards AFB, Calif.
EVALUATION OF THE BENT REFUELING BOOM AND THE UNIVERSAL AERIAL REFUELING SYSTEM FOR F-100 AND F-101 AIRCRAFT
James C. Scheuer and Norris J. Hanks. Dec 60, 109p
AFFTC-TR-60-60; AD-250 036
OTS $9.10

DESCRIPTORS: *Refueling, Fighters, *Jet fighters, *Jet planes, Maintenance, *Aircraft equipment, Flutter, Structures, Tests, Maneuverability, Flight testing,

This test was initiated to evaluate the suitability of the Universal Aerial Refueling System (UAR). Dummy tanks of the UAR system were jettisoned to confirm proper clearance from the aircraft. Maneuvering flight loads were investigated to establish structural integrity of the prototype tanks, and flutter tests were flown to

extend the flight envelope of the tanks beyond the normal operating airspeeds of the system. Inflight refueling hookups evaluated tanker/receiver compatibility, drogue configurations to prevent contact with the tail surfaces of the F-100 tanker, compatibility of the UAR package with the tanker aircraft, and operational and maintenance suitability of the package. The Dalmo-Victor refueling drogue was selected as the best universal drogue of six proposed drogues. (Author)

AD-290 606
[Almay Research and Testing Corp., Los Angeles, Calif.].
STUDY AND INVESTIGATION OF STRUCTURAL BOLTS, SCREWS, AND NUTS FOR USE IN THE CONSTRUCTION OF NAVAL AIRCRAFT AND MISSILES, PHASE I
Harry S. Brenner. 10 Nov 60, 130p
Contract NOas-57-817-c
Rept. no. G 8003; BUWEPS rept. no. RAAE-343-60-3
OTS $10.10

DESCRIPTORS: *Bolts, *Screws, *Locking fastener devices, Standards, Specifications, Materials, Alloys, Mechanical properties, Naval aircraft, Guided missiles.

Topics include: aeronautical structural requirements and design practices; weight reduction; space limitations in aircraft and missiles; conversion of critical material; availability; installation tooling and practice; manufacturing methods and practice. The foregoing were studied, investigated, and evaluated in light of the most recent information available to determine the optimum requirements, physical properties, mechanical properties, configurations, varieties, and potential of the subject threaded fasteners for use in Naval aircraft and missiles.

PB-165 048
Aviation Crash Injury Research, Phoenix, Ariz.
EXPERIMENTAL RESEARCH, DYNAMIC TEST OF AN EXPERIMENTAL TROOP SEAT
S. Harry Robertson. Jun 62, 44p
Contract DA44-177tc-802
Rept. no. AvCIR 62-5; TCREC Technical rept. 62-48
OTS $4.60

DESCRIPTORS: Aircraft equipment, *Aircraft seats, Test methods, Acceleration,

An experimental troop seat for Army aircraft was tested to determine if the use of an energy absorbing concept was practical and feasible. Three series of tests were conducted to determine the efficiency and practicality of using energy absorbing devices in the design of the seat. On the basis of these tests, it was determined that forces acting on the seat could be reduced by approximately one-half and the acceleration pulse shape could be changed from a high G triangular shape to a low G trapezoidal shape. (Author)

PB-165 063
California Univ., Los Angeles.
TEMPERATURE DISTRIBUTIONS IN A TYPICAL AIRCRAFT STRUCTURE DUE TO TRANSIENT EXTERNAL HEATING. VOLUME I, T-33 AIRPLANE. Rept. on Effects of Atomic Weapons on Aircraft Systems
Alphonso Ambrosio, Bertram Bussell, and William F. MacInnes. Apr 53, 101p
Contract AF33(616)293
WADC Technical rept. 52-216; AD-27 648
OTS $9.10

DESCRIPTORS: *Aircraft, Airfoils, *Heat transfer, Thermal stresses, Thermoelectricity, Analog systems, Measurement, *Thermal radiations,

Temperature distributions in an airfoil structure heated externally by linearly decaying heat inputs were obtained. The data are presented and discussed in terms of the effects of changes in the duration of the thermal input, unit thermal convective conductance, contact resistance between airfoil skin and stringers, and placement of stringers along the airfoil skin. (Author)

PB-165 066
California Univ., Los Angeles.
THERMAL STUDIES OF HONEYCOMB SANDWICH STRUCTURES EXPOSED TO TRANSIENT EXTERNAL HIGH-INTRACELLI RADIATION. Rept. on Effects of Atomic Weapons on Aircraft System
Takao Ishimoto and Harold Kaysen. Jan 58, 110p
Contract AF33(616)3221
WADC Technical note 57-243; AD-229 621
OTS $9.10

DESCRIPTORS:*Honeycomb cores, *Sandwich panels, *Aircraft, *Thermal radiation, *Heat transfer, Mathematical models, Analog systems, Analog computers, Measurement,

This report is one of a series of thermal studies concerning honeycomb sandwich structures introduced in high speed aircrafts. In particular, the present paper is concerned primarily with radiant energy transfer within the cells of honeycomb structures. A method of evaluating the approximate unidimensional flux distribution in an enclosure of arbitrary shape and subjected to an arbitrary unidimensional temperature distribution is developed. Essentially the method consists of: (1) the geometrical approximation of the enclosure with one or both of the two basic configurations, the cylinder and rectangular parallelepiped, employed in this study; and (2) the evaluation of the flux distribution in the basic configuration for the required temperature distribution. The net radiant flux in the basic configuration subjected to an arbitrary temperature distribution is evaluated by superposing results obtained by employing the radiation analog representing a basic cell with a specific temperature distribution. The utility of these results certainly is not limited to thermal radiation problems; they are just as applicable in other fields such as Illuminating Engineering.

NASA-TN-D-1970
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
DESCRIPTION OF AN ANALOG COMPUTER APPROACH TO V/STOL SIMULATION EMPLOYING A VARIABLE-STABILITY HELICOPTER
John F. Garren, Jr., and James R. Kelly, Jan 64, 15p
N64-12958
OTS $0.50

AD-285 493
Martin-Marietta Corp., Baltimore, Md.
DEVELOPMENT OF MANUFACTURING METHODS AND DESIGN PROCEDURES FOR BRAZED REFRACTORY METAL HONEYCOMB SANDWICH PANELS. Quarterly progress rept. no. 3, 1 Jun-1 Sep 62
J. W. McCown. [1962] 102p
Contract AF33(657)7276
Rept. no. ER 12534; ASD-TDR-62-7-937-(III)
OTS $9.10

DESCRIPTORS: *Sandwich panels, *Honeycomb cores, *Brazing, *Refractory coatings, *Molybdenum alloys, *Niobium alloys, *Heat shields, *Airplane panels, Metals, Manufacturing methods, Design, Titanium.

Brazed honeycomb sandwich panels using molybdenum and columbium core and facings provide lightweight structural coverings for high temperature application on an aerospace vehicle. Panel configurations selected for fabrication simulate a hot structural and a radiant heat shield application. TZM (Mo-0.5 Ti-0.08 Zr) molybdenum and D-36 (Cb-10 Ti-5 Zr) columbium alloys were used. Pfaudler PFR-6 oxidation protection coating for TZM and Thompson-Ramo Wooldridge Cr-Ti-Si coating for D-36 were selected to protect the panels during high temperature testing. Special tools and procedures were developed to fabricate the honeycomb core. All molybdenum welding was accomplished by electron beam techniques. A 4200° F cold-wall vacuum furnace was used to braze the honeycomb test panels. A quartz-lamp facility was used to heat the panels for structural testing. Thermal-cyclic and sonic fatigue tests were performed on heat shield test panels. A 4000° F cold-wall vacuum test chamber was used to determine material and honeycomb properties. (Author) (See also AD-426 680)

AD-426 680
Martin-Marietta Corp., Baltimore, Md.
MANUFACTURING METHODS AND DESIGN PROCEDURES FOR BRAZED REFRACTORY METAL HONEYCOMB SANDWICH PANELS. Interim engineering rept. no. 5, 1 Dec 62-1 Mar 63
J. W. McCown and A. Norton. [1963] 84p
Contract AF33(657)7276
Rept. no. ER 12850; IR-7-937-(V)
OTS $8.10

DESCRIPTORS: *Sandwich panels, *Honeycomb cores, *Brazing, *Refractory coatings, *Molybdenum alloys, *Niobium alloys, Silver solders, Metals, *Heat shields, *Airplane panels, Manufacturing methods, Design.

Processes were developed for brazing honeycomb sandwich panels using molybdenum and columbium core and facings. TZM (Mo-0.5Ti-0.08Zr) molybdenum and D-36 (Cb-10Ti-5Zr) columbium alloys were chosen for use on the program. Pfaudler PFR-6 oxidation protection coating for TZM and Thompson-Ramo-Wooldridge Cr-Ti-Si coating for D-36 were selected to protect the panels during high temperature testing. Special tools and procedures were developed to fabricate the honeycomb core. All molybdenum welding was accomplished by electron beam techniques. A 4200° F cold wall vacuum furnace was used to braze the honeycomb test panels. A quartz-lamp facility was used to heat the panels for structural testing. (Author) (See also AD 273 450)

AD-417 415
Martin-Marietta Corp., Baltimore, Md.
MANUFACTURING METHODS AND DESIGN PROCEDURES OF BRAZED REFRACTORY METAL HONEYCOMB SANDWICH PANELS. Final rept., 20 Nov 61-20 Sep 63
I. W. McCown, C. R. Wilks, L. J. Gagola, A. M. Norton, and M. Schwartz. 20 Sep 63, 222p
Contract AF33(657)7276
ASD-TDR-63-767
OTS $15.00

DESCRIPTORS: *Sandwich panels, *Honeycomb cores, *Brazing, Silver solders, *Molybdenum alloys, *Niobium alloys, Manufacturing methods, Design, *Heat shields, *Airplane panels, *Refractory coatings, Metals.

Manufacturing methods and design procedures were developed for fabricating details and vacuum brazing of TZM (Mo-0.5 Ti-0.07Zr) molybdenum and D-36 (Cb-10Ti-5Zr) columbium alloy honeycomb sandwich panels. These included the mar-forming of thin sheet, the welding and finishing of honeycomb core and the high temperature vacuum brazing of honeycomb sandwich panels. Panels simulating a heat shield and a structural application on aerospace vehicles were designed, fabricated and tested at temperatures up to 2600° F. The capability of fabricating, coating and utilizing brazed columbium sandwich panels on aerospace vehicles, with the r required design procedures for application at temperatures up to 2400° F, was demonstrated. Only partial success was achieved with the TZM molybdenum alloy, because of the manufacturing problems created by severe welding problems, encountered in edge sealing of TZM panels. All joints could be electron beam welded, but sporadic cracking upon cooling could not be eliminated. The trouble was considered to stem from high weld restraint and metallurgical incompatibilities in braze alloy--TZM weldments. (Author) (See also AD 285 493)

Chemical Engineering

IS-734
Ames Lab., Iowa State Univ. of Science and Tech.
DETERMINATION OF TURBULENT THERMAL DIFFUSIVITIES FOR FLOW OF LIQUIDS IN PIPES
William F. Beckwith and Ray Fahien. Nov 63, 131p
Contract W7405-eng-82
OTS $2.50

ANL-6779
Argonne National Lab., Ill.
TWO-PHASE CRITICAL FLOW WITH APPLICATION TO LIQUID-METAL SYSTEMS (MERCURY, CESIUM, RUBIDIUM, POTASSIUM, SODIUM, AND LITHIUM)
Hans K. Fauske. Oct 63, 49p
Contract W31-109-eng-38
OTS $1.25

BNL-6046
Brookhaven National Lab., Upton, N. Y.
EDDY TRANSPORT IN LIQUID-METAL HEAT TRANSFER
O. E. Dwyer. 18 Feb 62, 55p
Contract AT(30-2)GEN-16
OTS $5.60

BNL-6173
Brookhaven National Lab., Upton, N. Y.
EQUATIONS FOR BILATERAL HEAT TRANSFER TO FLUIDS FLOWING IN CONCENTRIC ANNULI
O. E. Dwyer. 10 Apr 62, 24p
Contract AT(30-2)GEN-16
OTS $2.60

BNL-836(PR-5)
Brookhaven National Lab., Upton, N. Y.
HIGH-TEMPERATURE LIQUID-METAL TECHNOLOGY REVIEW. A bimonthly technical progress review, Volume 1, no. 5. Oct 63, 82p
Contract [AT(30-2)GEN-16]
PR-5
OTS $2.00

PB-181 593
Desalination Research Lab., Mass. Inst. of Tech., Cambridge.
RESEARCH ON SALINE WATER CONVERSION BY FREEZING. Annual progress rept.
T. K. Sherwood and P. L. T. Brian. Mar 64, 59p
Contract 14-01-0001-295
Rept. no. 295-2; DSR-9336; Saline Water Research and Development progress rept. no. 96
OTS $1.25

DESCRIPTORS: *Sea water, *Desalination, Freezing, *Ice, *Crystallization, Phase studies, Additives, *Electroosmosis, Membranes, Solvent extraction.

Progress of the following areas of research is summarized: The effect of salt build-up at a phase boundary across which water, but not salt, is removed from brine; the removal of brine from ice-brine "slush" by counter current washing; the effect additives on crystallization of supercooled water.

PB-181 592
Desalination Research Lab., Mass. Inst. of Tech., Cambridge.
SALT CONCENTRATION AT PHASE BOUNDARIES IN DESALINATION PROCESSES
T. K. Sherwood, P. L. T. Brian, and R. E. Fisher. Mar 64, 49p
Contract 14-01-0001-295
Rept. no. 295-1; DSR-9336; Saline Water Research and Development Progress rept. no. 95
OTS $1.25

DESCRIPTORS: *Sea water, *Desalination, *Electro-osmosis, *Membranes, *Osmotic pressure, Salts, Chemical precipitation, Phase studies, Fluid flow

Estimates are provided on the importance of salt build-up for both turbulent and laminar flow of brine past the surface of an osmotic membrane. The analysis pertains to any constituent of the brine, and may be employed to describe the conditions which will lead to salt precipitation on the membrane, as well as the increase in effective osmotic pressure due to total salt build-up.

PB-181 588
Grace (W. R.) and Co., Clarksville, Md.
MINERAL BY-PRODUCTS FROM THE SEA
Murrell L. Salutsky, Maria G. Dunseth, and O. B. Waters, Jr. Mar 64, 146p
Contract 14-01-0001-281
Office of Saline Water Research and Development Progress rept. no. 91
OTS $2.75

DESCRIPTORS: *Sea water, *Desalination, Economics, *Potassium, Potassium compounds, Hydroxides, *Calcium, *Boron, Halogens, Lithium, Separation, Chemical precipitation, *Phosphates, Costs,

Studies were undertaken to provide information on the economical separation of mineral constituents from sea water or other saline waters. Areas of investigation included: recovery of K during the removal of scale-forming elements by phosphate precipitation; preferential removal of Ca by carbonate precipitation; reduction of the phosphate cost in the removal of scale-forming elements; economic recovery of potash; recovery of I, Br, F, B compounds, Li, and other metallic elements. It was concluded that, of all minerals that could be recovered, potash has the greatest potential for improving the economics of saline water conversion.

HW-SA-2915
Hanford Atomic Products Operation, Richland, Wash.
PRODUCTION OF REACTOR FUEL OXIDES FROM MOLTEN CHLORIDE SALT SOLUTIONS
G. E. Benedict, K. M. Harmon, G. Jansen, Jr., L. K. Mudge, and F. A. Scott. 15 May 63, 24p
Contract AT(45-1)1350
OTS $2.60

IDO-11400
Idaho Operations Office, Atomic Energy Commission, Idaho Falls.
ECONOMICS OF HYDROCRACKING DAMAGED COOLANT FROM ORGANIC REACTORS
J. L. Griffith and G. J. Russell. Nov 63, 56p
OTS $1.25

PB-181 594
Kaye (Joseph) and Co., Inc., Cambridge, Mass.
STUDY OF MULTI-PHASE EJECTORS FOR DISTILLATION DESALINATION SYSTEMS
Clarence A. Kemper, George F. Harper, John H. Leigh, and S. William Gouse. Jan 64, 81p
Contract 14-01-0001-329
Office of Saline Water Research and Development Progress rept. no. 97
OTS $2.25

DESCRIPTORS: *Sea water, *Desalination, *Distilling plants, Operation, Ejection, Exhaust systems, *Jet pumps

A theoretical study was made on a distillation type of desalinization system incorporating a multi-phase ejector (MPE) to achieve the driving temperature difference. The effects of pump efficiency, viscous friction, and mixing irreversibility in the MPE were considered. It was shown that for given operating conditions, pure work-input MPE desalinization systems are most attractive from an overall energy requirement basis. The possibility of staging various types of MPE systems was examined, and an ideal pure work-input MPE system was compared to the ideal minimum work requirement and a reversible adiabatic vapor compression system.

LAMS-2994
Los Alamos Scientific Lab., N. Mex.
LOSS OF ZIRCONIUM AND URANIUM FROM FLUIDIZED BEDS OF ZrC AND UC-ZrC PARTICLES AT HIGH TEMPERATURES
A. C. Juveland, H. P. Deinken, and J. E. Dougherty. Aug 63, 48p
Contract W7405-eng-36
OTS $1.25

PB-181 591
Massachusetts Inst. of Tech., Cambridge
SOLIDIFICATION AND SEPARATION OF ICE FROM SALINE WATER
Clyde M. Adams, Jr. and Pradeep K. Rohatgi, Oct 63, 43p
Contract 14-01-0001-279
Office of Saline Water Research and Development
Progress rept. no. 94
OTS $1.25

DESCRIPTORS: *Sea water, *Desalination, Freezing, *Ice, *Crystal structure, Separation, Magnetic fields,

Under conditions of relatively fast solidification (above 0.006 sec^{-1}) binary and ternary aqueous solutions over a wide range of concentrations freeze with the production of groups of parallel plate-shaped dendrites. Within each group the plates have a common crystallographic orientation. An increase in solute concentration causes an increase in dendrite spacing, and, at relatively high concentrations, the plate structure itself is altered with the production of serrations or side branches. Externally applied static and oscillating magnetic fields influence frozen structures in the same way as does increasing concentration. With increasing magnetic field the dendritic plates become more widely spaced and show a progressively increasing tendency towards serrated or side branching structures. Magnetic fields exert much less influence when freezing is initiated from a solid chill surface and takes place under gradient conditions than when freezing rates are uniform. Under conditions of gradient freezing, dendrite spacing continuously adjusts with freezing rate, but there are indications of hysteresis effects which tend to oppose this change. (Author)

PB-181 589
Oklahoma Univ. Research Inst., Norman
DEMINERALIZATION OF SALINE WATER BY ELECTRICALLY-INDUCED ADSORPTION ON POROUS CARBON ELECTRODES. Annual rept. no. 6
G. W. Murphy and J. J. Bloomfield. 1 Aug 63, 85p
Contract 14-01-001-160
Office of Saline Water Research and Development
Progress rept. no. 92
OTS $2.25

DESCRIPTORS: *Sea water, *Desalination, Adsorption, Porous materials, *Carbon, *Electrodes, Binders, *Electrolytes, Theory,

Details are given concerning the following research accomplishments: the construction and operation of a bench-scale demineralization unit (DC-5) utilizing several pairs of large, high-capacity electrodes; new polyelectrolyte dispersants for anion-responsive electrodes which yield high anion capacities and stable electrodes; polymeric binders which permit the preparation of cation-responsive electrodes with improved stability; the development of a fast means of characterizing electrodes; successful testing of demineralization electrodes against several ions other than Na^+ and Cl^-; several long-term demineralization tests of electrodes; the extension of the cell theory of electrolyte solutions to unsymmetrical electrolytes and to more concentrated solutions. (See also PB-171 129)

PB-181 590
Oklahoma Univ. Research Inst., Norman
DEMINERALIZATION OF SALINE WATER BY ELECTRICALLY-INDUCED ADSORPTION OF POROUS CARBON ELECTRODES. Final rept. for 1958-1963
George W. Murphy, J. J. Bloomfield, Frank W. Smith, W. E. Neptune, and Danny Candle. 1 Aug 63, 101p
Contract 14-01-001-160
Office of Saline Water Research and Development
Progress rept. no. 93
OTS $2.50

DESCRIPTORS: *Sea water, *Desalination, Adsorption, Porous materials, *Carbon, *Electrodes, Preparation, *Electrolytes, Theory, Costs,

Topics include: Fabrication and large-scale production of carbon electrodes; demineralization, studies; demineralization and concentration cells; electrochemical theory of demineralization and experimental results; development of cation- and anion-responsive electrodes; the bench-scale demineralization unit DC-5; studies of some process variables; cost estimate for a 100,000 GPD brackish water demineralization plant. (See also PB-181 589)

IDO-14623
Phillips Petroleum Co., Idaho Falls.
DETERMINATION OF PICRIC ACID AND MONONITROPHENOLS IN ICPP PROCESS SOLUTIONS
Stanley S. Yamamura and John H. Sikes. 25 Oct 63, 13p
Contract AT(10-1)205
OTS $0.50

DP-841
Savannah River Lab., Aiken, S. C.
PERFORMANCE OF A MULTI-STAGE CENTRIFUGAL CONTACTOR
Albert A. Kishbaugh. Oct 63, 27p
Contract AT(07-2)1
OTS $0.75

DP-809
Savannah River Lab., Aiken, S. C.
PUREX PROCESS PERFORMANCE WITH SHORT-RESIDENCE CONTACTORS
Carl S. Schlea, Myron R. Caverly, Hugh E. Henry, and William J. Jenkins. Sep 63, 32p
Contract AT(07-2)1
OTS $0.75

Electrical and Electronic Engineering

PB-165 072
[Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio].
MINUTES OF THE SPIRAL SLOT ANTENNA CONFERENCE HELD AT WADC BY THE ANTENNA DESIGN SECTION OF THE AERIAL RECONNAISSANCE LABORATORY, DATED 1 AND 2 MARCH 1955
E. M. Turner. 1 Jun 55, declassified Oct 57, 63p
Rept. no. 55WCLR-5165
OTS $6.60

DESCRIPTORS: *Slot antennas, *Spiral antennas, *Conferences, Bandwidth, Design, Aerial reconnaissance.

PB-165 057
Antenna Lab., Ohio State Univ. Research Foundation, Columbus.
RESEARCH ON ELECTRONIC RECONNAISSANCE ANTENNAS. Interim engineering rept., 1 Apr-30 Jun 60
C. H. Walter, R. Rudduck, R. Copeland, W. Lee, and W. Robertson. 1 Jul 60, 22p
Contract AF33(616)6211
Rept. 903-11; AD-242 911
OTS $2.60

DESCRIPTORS: *Lens antennas, *Conical antennas, *Antennas, Counter-measures, Design, Theory, Diodes, *Electronic circuits, Amplifiers, Circuits, Analysis, Helical antennas, Broadband, *Spiral antennas.

Measured results are given for a 15-wavelength diameter, two-dimensional, rim-radiating Luneberg lens modified to give maximum radiation at an angle of 45° with respect to the plane of the lens. The impedance of the conical spiral antenna is being studied theoretically and experimentally. The gain equation for an untuned tunnel-diode down-converter is derived, and measured results are presented for a tunnel-diode spiral antennaverter, a spiral antennaverter with conventional diode, and a dipole antenna with a conventional superheterodyne system. Two antennafier structures are described briefly. (Author)

AD-264 251
Army [Electronics] Research and Development Lab., Fort Monmouth, N. J.
DEVELOPMENT OF MINIATURE COAXIAL CONNECTORS
William E. Mayo. Apr 61, 29p
USASRDL Technical rept. 2186
OTS $2.60

DESCRIPTORS: *Miniature electronic equipment, *Coaxial cables, *Electric connectors, Broadband, Radiofrequency cables, Military requirements, Design, Operation

This report contains the design considerations, operating characteristics, and evaluation of a new and small broadband coaxial connector series, designated as the TPS type. The data presented is based on the following types: Bulkhead Jack UG-1364( )/U, Connector Receptacle UG-1365( )/U, Connector Plug UG-1366( )/U, Adaptor (TPS to TPS) (UG-1367( )/U, and Adaptor (TPS to BNC) UG-1368( )/U. The connector series is intended for use with small 50-ohm radio-frequency coaxial cables ranging in size from 0.185 to 0.216 inch O.D. at frequencies up to 10,000 mc. (Author)

NAA-SR-MEMO-6741
Atomics International, Canoga Park, Calif.
HIGH TEMPERATURE SEEBECK COEFFICIENT APPARATUS
E. G. Forster, Jr. and A. J. Saur. 1961, 31p
Contract AT(11-1)GEN-8
OTS $3.60

PB-181 598
Bureau of Naval Weapons, Washington, D. C.
HIGH RESISTANCE MUELLER BRIDGE TYPE G-3; LEEDS AND NORTHRUP 8069-S. Navy Calibration Program. 1 Dec 63, 66p
Standards Lab. Instrument Calibration Technique DR-04, rev. 1
OTS $1.75

DESCRIPTORS: *Measuring devices (Electrical and Electronic), *Electric bridges, Design, Resistance thermometers, Resistance (Electrical), *Calibration, Data, Variable resistors, Instruction manuals

The G-3 Mueller bridge is a special form of Wheatstone bridge designed specifically for the purpose of precise measurements of resistance (of the type required in temperature measurements with resistance thermometers). The bridge is capable of resistance measurements up to approximately 422 ohms in steps of 10 microhms. The unique features of the bridge are provision for establishing equality of its ratio arms, switching to reduce the erroneous effects of the lead wires to the resistance thermometer, and significant reduction of the effects of contact resistance variations in the rheostat arm. (Author)

PB-181 596
Bureau of Naval Weapons, Washington, D. C.
LEEDS AND NORTHRUP PRECISION GUARDED WHEATSTONE BRIDGE 4232-B. Navy Calibration Program. 1 Jun 63, 41p
Standards Lab. Instrument Calibration Technique DR-01, rev. 1
OTS $1.25

DESCRIPTORS: *Electric bridges, *Measuring devices (Electrical and Electronic), Design, Variable resistors, *Calibration, Resistance (Electrical), Measurement, Data, Test equipment (Electronic), Instruction manuals.

The bridge is designed for making direct current resistance measurements over a range of 1.0 ohm to 11,111.0 megohms. The bridge consists primarily of a rheostat arm and two ratio arms within a guarded network. The rheostat arm is made up of six decades, each of which has ten resistors of the same nominal value. The total resistance of the rheostat arm is 111,111.0 ohms, and is adjustable in steps of 0.1 ohm. The ratio arms consist of eight resistors in a plug and block arrangement, which allows any of the resistors to be selected for either ratio arm. (Author)

PB-181 597
Bureau of Naval Weapons, Washington, D. C.
SIX-DIAL UNIVERSAL RATIO SET. Navy Calibration Program. 15 Dec 62, 59p
Standards Lab. Instrument Calibration Technique DR-03, rev. 1
OTS $1.50

DESCRIPTORS: *Measuring devices (Electrical and Electronic), Design, Resistance (Electrical), *Calibration, Test equipment (Electronic), Test methods, Tests, Data, Instruction manuals

This technique described the calibration of a six-dial universal ratio set (URS), an instrument designed as a wide-range ratio device which permits the direct comparison of resistances of largely differing values. In general the URS has a constant nominal resistance of 2111.110 ohms. By manipulation of its six dials it is possible to make a potential connection to any point of the 2111.110 ohms to the nearest 0.001 ohm. Effectively the URS is a long slide-wire with the moving contact serving as the potential point. (Author)

NASA-TM-X-940
Canterbury Univ., Christchurch (New Zealand).
A PRACTICAL METHOD FOR DETERMINING THE DIRECTIVITY OF H. F. AND V. H. F. ANTENNA SYSTEMS
C. S. L. Keay and R. E. Gray. Jan 64, 20p
Grant NsG-219-62
N64-13053
OTS $0.50

PB-165 069
Electronics Research Lab., Univ. of California, Berkeley.
A STATISTICAL ANALYSIS OF THE SYNCHRONIZATION OF DIGITAL RECEIVERS. Scientific rept. no. 12
H. Kaneko. 11 Apr 62, 86p
Contract AF19(604)5466
IER Series no. 60, issue no. 446; AFCRL-62-938
OTS $3.10

DESCRIPTORS: Communication systems, *Data transmission systems, Digital systems, *Transmitter-receivers, *Synchronization (Electronics), Statistical analysis, Probability, Errors.

The probability of error of certain digital transmission systems is investigated, under the condition that the transmitter-receiver synchronization is imperfect. It is assumed that the receiver is the Bayes receiver that would be optimum were the synchronization perfect. It is further assumed that a synchronizing signal is transmitted separately from the information-bearing signals, and that the sum of the two signal powers is constrained to a given value. The conditional error probability for a given synchronization error is evaluated for two particular binary systems, one using bipolar rectangular pulses and the other using unipolar cosine-squared pulses. The optimum synchronizer for the case of a sine-wave synchronizing signal is analyzed. The average error probability is then calculated by averaging the conditional error probability, given the synchronization error, over the distribution of synchronization error for this synchronizer. This average error probability is then minimized with respect to partition of the available power between the synchronizing and information channels. A detailed analysis and curves are given for the case of bipolar rectangular information signals. (Author)

PB-165 080
[Institute of Science and Technology] Univ. of Michigan, Ann Arbor.
AN EXPERIMENTAL AND THEORETICAL EVALUATION OF THE LUMICON. Rept. on Proj. Michigan
W. G. Elliott and H. Richard Blackwell. Nov 59 26p
Contract DA36-039-sc-78801
Rept. no. 2900-3-T; AD-229 484
OTS $2.60

DESCRIPTORS: *Electronic scanners, Television display systems, Iconoscopes, Targets, Detection, Identification systems, Tests, Optical systems.

Experimental evaluations have been made of the detection and identification capabilities of an observer equipped with an electro-optical device known as the Lumicon, in comparison with the capabilities of the observer's unaided eye. The Lumicon was expected to increase detection and identification capabilities by providing the observer with a display of the scene having greater over-all luminance than the original. Detection capabilities were assessed by measuring the threshold for a simple disc target. Measurements were made both with white light and with monochromatic light of various wavelengths of visible radiation from 350 to 700 $m\mu$. A wide range of luminance values of white light was used. Identification was assessed by the resolution threshold for a black-and-white grating. In general, the Lumicon offered little advantage over the unaided eye. The results are discussed in terms of a theoretical analysis of the limitations to be expected in electro-optical devices, due to quantum fluctuations in the photo-detector stage. (Author)

N63-22166
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARINER 2 SOLAR PANEL DESIGN AND FLIGHT PERFORMANCE
John A. Zoutendyk, Robert J. Vondra, and Arvin H. Smith. 28 Jun 63, 46p
Contract NAS7-100
Technical rept. no. 32-455; NASA CR-51514
OTS $4.60

AD-415 482
Lear Siegler, Inc., Grand Rapids, Mich.
HYDROKINETIC SENSING TECHNIQUE STUDY.
Final Rept. for Feb 62-Feb 63. Sep 63, 85p
Contract AF33(657)7990
Rept. no. GR-1425; ASD-TDR-63-467
OTS $2.25

DESCRIPTORS: *Hydrodynamics, *Electrostatics, *Suspension devices, Supports, Servomechanisms, Noise, Programming (Computers), Mathematical models, Electronic equipment.

This program represents a continuation of studies of hydrokinetic rate sensing techniques. This effort was to determine the feasibility of suspending a research model of a hydrokinetic rate sensor by electrostatic force, eliminating mechanical bearing noise so that the threshold rate sensing capabilities of the device might be studied. Although the design problems, such as transmitting the rate signal across the electrode gap by a non-contacting means were solved, it is shown that the complexity and expense of the electrostatic suspension preclude its use in this application. The theory of its operation is developed, however, as represented by a non-linear mathematical model and confirmed by laboratory experiments. An analog simulation is evolved upon which future electrostatic support systems may be evaluated. (Author)

N63-21651
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
PROCEDURES FOR POTTING CABLE ASSEMBLIES USING EPOXY RESINS
12 Apr 62, 46p
MSFC-PROC-196; NASA TM X-50375
OTS $4.60

PB-165 055
Naval Ordnance Lab. [White Oak, Md.]
A FREQUENCY SPECTRUM ANALYZER FOR THE STUDY OF SERVOMECHANISMS
Frank H. Ferguson. 16 Jan 48, 28p
NOLM 9317
OTS $2.60

DESCRIPTORS: Frequency, *Spectrum analyzers, Servomechanisms, Design, Operation.

An instrument is described which permits application of frequency spectrum technique in the study of naval servomechanisms. Quantitative observations of the steady state magnitude and phase of system responses may be made precisely and rapidly. The functional relations of servo system parameters to servo responses may be determined. The material of this memorandum presents a brief introduction to frequency spectrum analysis, describes in detail the construction of the present apparatus, and discusses applications of the instrument for the evaluation of regulatory systems and system components. (Author)

AD-292 151
North American Aviation, Inc., Los Angeles, Calif.
DEVELOPMENT OF HIGH TEMPERATURE AIRCRAFT ELECTRICAL SYSTEM. Final rept., 1 Jul 57-15 Feb 62
J. J. Pierro, R. C. Starkey, R. R. Appleby, D. L. Burkholder, and F. K. Moon, Jr. Nov 62, 406p
Contract AF33(600)35489
Rept. no. NA-61-1383; ASD-TDR-62-472
OTS $22.25

DESCRIPTORS: *Aircraft equipment, *Electrical equipment, High temperature research, *Electric motors, *Constant speed drives, *Motor generators, *Voltage regulators, *Transformers, *Electric connectors, *Electric terminals, *Rectifiers, *Electric wire, *Fuses (Electrical), *Circuit breakers.

The development and test of a complete airborne electrical generation and distribution system for operation in a 600°F ambient temperature - 80,000 feet environment are outlined. This system consists of a 40 KVA constant-speed drive (CSD) and a-c generator including frequency controls, automatic paralleling, regulator, and protective panel; current transformer; contactor; 50 ampere transformer-rectifier; wire; terminals; fuses; circuit breakers; and motors. These components were tested individually and connected as a generating system. The system was subjected to compatibility and performance evaluation tests throughout the temperature range for which they were designed. A physical and functional description of these components, including photographs, drawings, and schematics is presented. A detailed discussion of the integrated system test covering the test installation, test parameters and test results is also presented. Results of these tests demonstrate operation of the system up to 600°F and indicate performance comparable to current state-of-the-art. (Author) (See also AD-271 895)

PB-165 091
Radio Corp. of America, Harrison, N. J.
SOLID STATE IMAGE INTENSIFIER. Quarterly rept. no. 2, 1 July-30 Sep 59
R. W. Christensen, A. L. Smith, and N. R. Goldstein. 15 Oct 59, 38p
Contract AF33(616)6360
AD-228 168
OTS $3.60

DESCRIPTORS: *Image intensifiers (Electronics), *Amplifiers, Design, Light, *Semiconductors, Photoconductivity, Materials, *Cadmium compounds, Selenides, Electroluminescence, Test equipment (Electronics).

Improving Cadmium Selenide: Work resulted in a considerable improvement in the state of the art. Cadmium-selenide was prepared by the techniques of elemental fusion and precipitation such that the desired purity of this material is within reach. New Photoconductors: Indium sulfide (In_2S_3) was fabricated and sensitized so that in the standard gap test samples of this material exhibited appreciable light to dark current ratios. Application Studies: To facilitate testing of photoconductors, the technique of doctor blading was evaluated. The method permits the uniform depo-

sition of photoconductive materials and facilitates rapid evaluation of samples. Improvement of the m Factor: It has been possible to reduce the m factor considerably by using fritted electroluminescent layers and also by overlaying thin settled phosphor in plastic layers with titanium dioxide. Improvement of Resolution: Resolution has been improved from the present 2 lines per mm to 4 lines per mm through the use of a fritted sandwich type of intensifier. (Author)

PB-165 092
Radio Corp. of America, Harrison, N. J.
SOLID STATE IMAGE INTENSIFIER. Quarterly rept. no. 3, 1 Oct-31 Dec 59
R. W. Christensen, A. L. Smith and others. 15 Jan 60 [23p]
Contract AF33(616)6360
AD-231 058
OTS $2.60

DESCRIPTORS: *Image intensifiers (Electronics), Photoconductivity, *Amplifiers, Design, *Semiconductors, Cadmium compounds, Selenides, Powders, Light.

Effort was devoted primarily to experimental work on photoconductors and a study of grain. The purpose of the experimental work on photoconductive materials was to find a suitable material for use as the controlling element in the image intensifier. With regard to grain the ultimate objective of this work is to minimize or eliminate entirely the objectionable graininess in the output of the intensifier. (Author) (See also PB-165 091)

PB-165 093
Space Technology Labs., Inc., Los Angeles, Calif.
COMPONENTS PACKAGING TECHNIQUES. Semiannual rept., 1 Jan-30 Jun 60, on Proj. Plan 165-21
L. K. Lee and W. T. Russell. [1960] 54p
Contract AF04(647)309
STL/TR-60-0000-09179; AFBMD-TR-60-93
OTS $5.60

DESCRIPTORS: *Microminiaturization (Electronics), *Packaged circuits, *Modules (Electronic), Welding, Circuits, Reliability (Electronics), Checkout equipment, Gyroscopes,

The report summarizes studies of electronic components packaging techniques. These studies were largely concerned with welding for connection of electronic parts into functional circuit modules, facilitating design techniques not possible with conventional soldered circuitry. In addition, study was made of methods for packaging gyroscopes for optimum operational heat stabilization. Miniaturization studies included electrical evaluation of the performance of micromodules fabricated by vacuum deposition and other advanced methods. Materials and processes investigations covered the determination of welded wire properties, methods, and standards, application of foam encapsulation materials, and study of materials for use in space environments. In the field of structural design, the random vibration response of two coupled resonators was analyzed and studies were started on mechanical impedance measurement techniques. (Author)

PB-165 032
Stanford Electronics Labs., Stanford Univ., Calif.
MICROWAVE MIXING AND FREQUENCY DIVIDING
R. W. DeGrasse and G. Wade. 12 Nov 57. 11p
Contract AF19(604)1847
Technical rept. no. 386-1; AD-152 674
OTS $1.60

DESCRIPTORS: Microwaves, *Mixer tubes, *Frequency dividers, *Microwave equipment, Traveling-wave tubes, *Electron tubes, Operation, Effectiveness, Tests,

Data obtained from frequency mixing experiments and from related experiments in frequency division demonstrated the feasibility of achieving effective mixing and dividing in microwave tubes. In all of the experiments the nonlinearity of an overmodulated electron beam was used to produce the desirable effects. Mixing conversion gains as high as 30 db and strong divided-frequency signals were obtained from TWT. Much experimental data were obtained from an S-band TWT having 2 identical helices. The tube was operated as a mixer with the local oscillator signal and the input signal applied to the input of the first helix. The IF signal was then obtained at the output of the second helix. An attenuator was then added to the second helix to reduce the effects of possible feedback through the second helix. Operation of the tube was very stable. Even with the attenuator absent a substantial increase in the beam current did not produce oscillations. Another mixer experiment was performed by using a conventional, helix-type, X-band TWT. An S-band resonant cavity was fitted over the tube envelope and positioned with the cavity gap concentric with the beam and located between the helix output and the beam collector. This method of obtaining a mixer output was much less effective than the previous one. The double-helix tube was tested as a frequency divider at 4000 mc with good results. Successful dividing was also obtained from a conventional (a single-helix) S-band TWT. (DDC abstract)

N64-13011
Westinghouse Electric Corp., Baltimore, Md.
MIROS PROGRAM. Progress letter no. 4, 20 Aug 20 Sep 63 [1963] 12p
Contract NASw-703
NASA CR-51425
OTS $1.60

Mechanical Engineering

PB-181 599
Pope, Evans and Robbins [New York].
PACKAGE COAL-FIRED BOILERPLANT 80,000 LBS. PER HR. CAPACITY BELOW GROUND COAL STORAGE VERSION [1963] 142p
[Contract OCR14-01-0001-242]
Specification no. OCR-80
OTS $7.00

DESCRIPTORS: *Power plants (Establishments), *Boilers, Coal, *Storage, *Tanks (Containers), *Underground structures, Design, Specifications, Construction, Automation,

Specifications are given for a coal fired boiler plant, of 80,000 lb./hr. capacity, along with auxiliary equipment and structures. The plant consists of two boilers of the conventional bent tube design. Coal storage is in

the form of two 160 ton coal tanks, with a system for automatically transferring coal to the stokers and removing ashes to an ash silo. The plant is designed to operate automatically with intermittent attendance by one operator.

PB-181 600
Pope, Evans and Robbins [New York].
PACKAGE COAL-FIRED BOILERPLANT 80,000 LBS. PER HR. CAPACITY: ABOVE GROUND COAL STORAGE VERSION [1963] 141p
[Contract OCR14-01-0001-242]
Specification no. OCR-80A
OTS $7.00

DESCRIPTORS: Power plants (Establishments), *Boilers, Coal, *Storage, *Tanks (Containers) Design, Specifications, Construction, Automation

Specifications are given for a coal-fired boiler plant, of 80,000 lb/hr. capacity, along with auxiliary equipment and structures. The plant consists of two boilers, and coal storage is in the form of a combination coal and ash storage silo with a capacity of about 345 tons of coal and 25 tons of ash. Coal transfer to stoker hoppers and ash removal to the silo is automatic. The plant is designed to operate automatically with intermittent attendance by one operator.

Ordnance, Missiles, and Satellite Vehicles

AD-402 381
Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
ANODIZED ALUMINUM COATINGS FOR TEMPERATURE CONTROL OF SPACE VEHICLES. Final rept., 1 Aug 61-1 Sep 62, on Nonmetallic and Composite Materials
James H. Weaver. Feb 63, 36p
ASD-TDR-62-918
OTS $3.60

DESCRIPTORS: *Spacecraft, Temperature control, *Heat shields, Reflectors, *Metal coatings, *Aluminum coatings, Solar radiation, Ultraviolet radiation,

The first attempt to accurately relate the factors associated with the preparation of anodized aluminum coatings to their thermal control properties for aerospace use is presented. An understanding of the expected performance of these coatings has been obtained and conditions for maximizing properties have been elucidated. A coating useful for maintaining a high reflectance of solar energy with high emittance has been prepared. The effects of the simulated environment on the optical properties of anodic coatings have been determined. Preliminary data indicate that the vacuum - ultraviolet effects are the most detrimental to the optical properties of the anodized aluminum coating. The selection of this coating on space vehicles should be confined to interior use only. (Author)

NASA-TN-D-2127
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
RETURN TRAJECTORIES FROM THE MOON: SOME LIMITS DUE TO RESTRICTIONS ON ENTRY RANGE AND LANDING LIGHTING CONDITIONS
Luigi S. Cicolani, Jan 64, 25p
N64-12689
OTS $0.75

NASA-TN-D-2129
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
SECONDARY ERRORS AND OFF-DESIGN CONDITIONS IN OPTIMAL ESTIMATION OF SPACE VEHICLE TRAJECTORIES
Gerald L. Smith. Jan 64, 68p
N64-12718
OTS $1.75

AD-277 469
Bendix Corp., Southfield, Mich.
RESEARCH ON "SUPER" NON-ELECTRONIC COMPONENTS. Final rept.
T. L. McNorton and B. R. Teitelbaum. Apr 62, 183p
Contract AF33(616)7954
ASD-TDR-62-27; N62-13572
OTS $13.00

DESCRIPTORS: *Rocket components, Spacecraft, *Flight control systems, *Attitude control systems, *Pneumatic devices, Reliability, Bibliographies,

The study is concerned with the derivation and description of a program for making substantial improvements in the reliability of non-electronic flight control system components. The achievement of "super" components would make possible corresponding improvements in the reliability of complete flight control systems. A specific component, a cold gas, proportional mode, attitude control valve (reaction controller) was selecte as an example to demonstrate the program approach. An analysis of the failure mechanisms in the example component is given and suggestions for control and elimination of these mechanisms are advanced. Experimental work supplementing the analysis is described. A method is given for making effective use of the capabilities of several technically qualified individuals in identifying failure modes and ranking the modes in order of seriousness. The procedures to be included in a formal reliability program, oriented to a general component development effort, are recommended. A treatment of the mathematical aspects of reliability is given in an appendix. (Author)

NASA-TN-D-1916
Booz-Allen Applied Research, Inc., Chicago, Ill.
LAUNCH ENVIRONMENT PROFILES FOR SOUNDING ROCKETS AND SPACECRAFT
W. J. Neff and R. A. Montes de Oca. Jan 64, 38p
Contract NAS5-2415
N64-12713
OTS $1.00

N63-22174
Exotech Inc., Alexandria, Va.
INVESTIGATION OF PRECESSION CONTROL AND ORBIT MAINTENANCE SYSTEMS FOR ROTATING SPACE STATIONS. Summary rept.
May 63, 88p
Contract NASw-543
Report TR-002; NASA CR-51729
OTS $8.10

NASA-TM-X-938
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ANALYSIS OF DISSIMILAR SATELLITE APPENDAGES DURING ERECTION
Richard W. Forsythe Jan 64, 18p
N64-12957
OTS $0.50

NASA-TM-X-936
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ENERGY ABSORBER FOR THE ARIEL I INSTRUMENT BOOMS
T. L. Eng, Jan 64, 15p
N64-12873
OTS $0.50

NASA-TM-X-941
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A LIGHTWEIGHT FOLDING BOOM FOR ACCURATELY PLACING SCIENTIFIC EXPERIMENTS UP TO 25 FEET FROM LARGE SPACECRAFT
John P. Bauernschub, Jr. Jan 64, 11p
N64-12875
OTS $0.50

NASA-TM-X-937
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A METHOD FOR SIMULATING ZERO-GRAVITY ERECTION OF SATELLITE APPENDAGES
Richard W. Forsythe. Jan 64, 15p
N64-12874
OTS $0.50

N63-21899
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
RESULTS OF REPACKAGING THE CROSLEY-AVCO MODEL 183114 COMMAND RECEIVER
David S. Hepler and C. Raymond Somerlock. Jul 63, 36p
Technical memo X-50425; NASA X-632-63-143
OTS $3.60

N63-21993
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT. VOLUME 3, NO. 2
Ralph R. Stroble. 16 Jan 63, 8p
Technical memo X-50339; NASA X-533-63-1
OTS $1.10

N63-22007
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOLUME 3, NO. 8
10 Apr 63, 7p
Technical memo X-50197; NASA X-533-63-1
OTS $1.10

N63-22009
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOLUME 3, NO. 12
15 Jun 63, 10p
Technical memo X-50200; NASA X-533-63-1
OTS $1.10

N63-22010
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOLUME 3, NO. 13
30 Jun 63, 9p
Technical memo X-50196; NASA X-533-63-1
OTS $1.10

N63-21992
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOLUME 2, NO. 14
Ralph R. Stroble. 14 Aug 62, 7p
Technical memo X-50366; NASA X-533-63-1
OTS $1.10

N63-22170
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOL. 3, NO. 15
31 Jul 63, 9p
Technical memo X-50335; NASA X-533-63-1
OTS $1.10

N63-22169
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOL. 3, NO. 16
15 Aug 63, 9p
Technical memo X-50364; NASA X-533-63-1
OTS $1.10

N64-10337
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SATELLITE SITUATION REPORT, VOL. 3, NO. 20
15 Oct 63, 9p
X-583-63-1
Technical memo X-51120
OTS $1.10

NASA-TN-D-1763
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SINUSOIDAL VIBRATION TESTING OF NONLINEAR SPACECRAFT STRUCTURES
William F. Bangs. Sep 63, 14p
N63-21888
OTS $0.50

PB-165 074
[IIT Research Inst.] Chicago, Ill.
DEVELOPMENT AND ATTACHMENT OF FINE WIRE DETONATOR ELEMENTS. Summary rept. no. 12, 1 Jun 48-1 Jun 49
H. D. Kessler, W. C. Troy, and R. A. Lubker. 29 Jun 49, declassified, 34p
Contract NOrd 10275
Proj. no. 90-651B
OTS $3.60

DESCRIPTORS: *Detonators, Wire, Drawing (Machine processing), Electrolytic polishing, Filaments, Primers, Materials, Metals, Alloys,

Several methods for producing fine wire for low energy primers are investigated. A method was developed for electropolishing stainless steel wire down to a diameter of 0.00015 inch. Firing tests indicated that this wire may be directly applicable for primers. Several methods are investigated for producing substitute filaments. Electrodeposited filaments of nickel on graphite offer some promise but are not stable during storage. Vapor deposited chromium filaments on glass plugs are promising, but these also are unstable. Titanium-smear filaments on glass plugs show the best firing characteristics and are the most stable of the substitute filaments. (Author)

N64-10310
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EARTH-VENUS TRAJECTORIES, 1968-69, VOLUME 4, PART A
V. C. Clarke, R. Y. Roth, W. E. Bollman, T. W. Hamilton, and C. G. Pfeiffer. 1 Aug 63, 791p
Contract NAS7-100
Technical memo no. 33-99; NASA CR-52465
OTS $31.00

N63-22165
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MARINER SPACECRAFT PACKAGING
Julius Jodele. 1 Jul 63, 20p
Contract NAS7-100
Technical rept. no. 32-451; NASA CR-51422
OTS $1.60

N64-13278
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A SIMPLIFIED MODEL OF MIDCOURSE MANEUVER EXECUTION ERRORS
C. R. Gates. 15 Oct 63, 8p
Contract NAS7-100
Technical rept. no. 32-504; NASA CR-53032
OTS $1.10

N64-13407
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-16, VOLUME VI FOR THE PERIOD MAY 1, 1962 - AUGUST 1, 1962. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES. 31 Aug 62, 79p
Contract NAS7-100
NASA CR-53036
OTS $7.60

N64-13262
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-23, VOLUME IV, FOR THE PERIOD AUGUST 1, 1963 TO SEPTEMBER 30, 1963. SUPPORTING RESEARCH AND ADVANCED DEVELOPMENT
31 Oct 63, 327p
Contract NAS7-100
NASA CR-53001
OTS $19.75

N64-13263
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-23, VOLUME 6, FOR THE PERIOD JULY 1, 1963 TO SEPTEMBER 30, 1963. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES
31 Oct 63, 89p
Contract NAS7-100
NASA CR-53009
OTS $8.10

NASA-TM-X-944
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
FLIGHT INVESTIGATION OF A SOLAR ORIENTATION CONTROL SYSTEM FOR SPACECRAFT
Anthony Fontana, Julian D. Maynard, Marcus L. Brumfield, and Otis J. Parker, Jan 64, 50p
N64-12712
OTS $1.25

NASA-TN-D-2035
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
LANDING CHARACTERISTICS OF A REENTRY VEHICLE WITH A PASSIVE LANDING SYSTEM FOR IMPACT ALLEVIATION
Sandy M. Stubbs. Jan 64, 25p
N64-12877
OTS $0.75
(Tech. film suppl. L-807 is available from NASA, Langley Res. Center)

NASA-TN-D-1561
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ASYMMETRIC "PENSHAPE" NOZZLES IN JET-CANARD CONFIGURATIONS FOR ATTITUDE CONTROL
Robert W. Cubbison. Sep 63, 28p
N63-21887
OTS $0.75

NASA-TN-D-1995
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
EARTH ORBITAL SATELLITE LIFETIME
James E. Ladner and George C. Ragsdale, Jan 64, 32p
N64-12714
OTS $1.00

NASA-TN-D-1829
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
PERFORMANCE ANALYSIS OF HIGH-ENERGY CHEMICAL STAGES FOR INTERPLANETARY MISSIONS
Walter H. Stafford, Sam H. Harlin, and Carmen R. Catalfamo. Jan 64, 142p
N64-13054
OTS $2.75

NASA-TN-D-1836
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
TECHNIQUES FOR PREDICTING LOCALIZED VIBRATORY ENVIRONMENTS OF ROCKET VEHICLES
Robert E. Barrett. Oct 63, 65p
N63-21889
OTS $1.75

NASA-TN-D-2001
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
TOUCHDOWN DYNAMICS ANALYSIS OF SPACECRAFT FOR SOFT LUNAR LANDING
Robert E. Lavender. Jan 64, 39p
N64-12876
OTS $1.00

TID-15761
Sandia Corp., Albuquerque, N. Mex.
TIP BURNOFF OF SHARP NOSE CONICAL RE-ENTRY VEHICLES
R. D. Krieg. Apr 62, 22p
Contract AT(29-1)789
SCTM-76-62(71)
OTS $2.60

PB-165 088
Sperry Products, Inc., Danbury, Conn.
ULTRASONIC NONDESTRUCTIVE MEASUREMENT OF CASE DEPTH. Final rept.
Andrew M. Murdoch and Richard A. Wilson. 30 Nov 57, 16p
Contract DA20-089-ORD-73092
Engineering rept. TR-076
OTS $1.60

DESCRIPTORS: *Hardness, *Ultrasonic radiation, *Steel, Castings, Molybdenum castings, Chromium alloys, Instrumentation, *Non-destructive testing Ordnance

Developing a method and associated gage equipment for measuring case depth and case hardness was effected in three phases. During phase I the pulse echo structure scattering technique was applied to direct case depth measurements of Cr- Mo steels. Measuring case hardness by a pulse echo surface mode velocity technique and by ultrasonic techniques were suggested. During phase II a high resolution high gain-high frequency ultrasonic pulse echo technique was applied to give absolute case depth measurement in Cr-Mo steel specimens and tank parts. Phase III included the design and fabrication of a prototype case depth measuring instrument. (Depth-O-Scope) and a single crystal search unit positioner for normal-to-surface testing on the turret ring ball race.

PB-165 087
Sperry Products, Inc., Danbury, Conn.
ULTRASONIC NONDESTRUCTIVE MEASUREMENT OF CASE DEPTH. Final rept.
Andrew M. Murdoch and Richard A. Wilson. 30 Nov 57, 74p
Contract DA20-089-ORD-38515
Engineering rept. TR-077
OTS $7.60

DESCRIPTORS: *Non-destructive testing, *Ultrasonic radiation, Tank turrets, *Steel, Metallography, Castings, Ordnance steel, Ordnance

Tests were conducted on flat samples of tank turret ring supplied by the Detroit Arsenal. Data taken is tabulated in the body of this report. Optimum spacing and incident angle for the two search unit test method was established. A single search unit "off normal" method was investigated; this method proved to have test results superior to the two search unit method and is considerably less critical in alignment. The Depth-O-Scope can achieve a reading of case depth from ultrasonic discontinuity in the transition zone of the case hardened flat samples and the turret ring ball race. The accuracy of measurement is considered to be ±.016 inches with reference to visual readings taken from the etched flat samples. The accuracy of measurement on the turret ball race is considered to be ±.024 inches. (Author)

Sanitation and Safety Engineering

ANL-6786
Argonne National Lab., Ill.
ARGONNE NATIONAL LABORATORY RADIOLOGICAL ASSISTANCE TEAM
G. T. Lonergan and W. H. Smith. Oct 63, 37p
Contract W31-109-eng-38
OTS $1.00

HW-SA-2609
Hanford Atomic Products Operation, Richland, Wash.
ELEMENTS OF EMERGENCY PLANNING FOR COPING WITH A SERIOUS RADIATION ACCIDENT
A. R. Keene, C. M. Unruh, G. E. Backman, and L. A. Carter. 11 Jun 62, 22p
Contract AT(45-1)1350
OTS $2.60

HW-78395
Hanford Atomic Products Operation, Richland, Wash.
EVALUATION OF RADIOLOGICAL CONDITIONS IN THE VICINITY OF HANFORD, APRIL-JUNE, 1963
R. H. Wilson, ed. 16 Aug 63, 29p
Contract AT(45-1)1350
OTS $0.75

LAMS-2983
Los Alamos Scientific Lab., N. Mex.
IMPACT AND THERMAL TESTS ON TRANSPORT CONTAINERS ICC 2-R AND ICC 6-J
Horace E. Noyes. Oct 63, 13p
Contract W7405-eng-36
OTS $0.50

LAMS-2962
Los Alamos Scientific Lab., N. Mex.
RADIATION HAZARD RESULTING FROM TRITIUM DIFFUSION IN GLOVE BOX OPERATIONS
George N. Krebs, Jr. 6 Aug 63, 13p
Contract W7405-eng-36
OTS $0.50

DPSPU-63-30-10
Savannah River Lab., Aiken, S. C.
RADIUM CONTENT OF DRINKING WATER IN THE CENTRAL SAVANNAH RIVER AREA
W. F. Edgar. Apr 63, 8p
Contract AT(07-2)1
OTS $1.10

COO-275
Unidynamics, St. Louis, Mo.
INVESTIGATION OF THE EFFECTS OF IONIZING RADIATION ON SYNTHETIC DETERGENTS, SEWAGE COLLOIDAL CHARACTERISTICS AND SEWAGE SEDIMENTATION. Final rept. 6 Sep 63, 107p
Contract AT(11-1)905
OTS $2.25

FOOD, HANDLING, AND PACKAGING EQUIPMENT

TID-19206
California Univ., Davis.
RADIATION TECHNOLOGY IN CONJUNCTION WITH POSTHARVEST PROCEDURES AS A MEANS OF EXTENDING THE SHELF LIFE OF FRUITS AND VEGETABLES. Annual rept. 1 Feb 62-30 Jan 63. 15 Oct 63, 182p
Contract AT(11-1)34
OTS $2.75

NSEC-85
Nuclear Science and Engineering Corp., Pittsburgh, Pa.
DEVELOPMENT OF DOUBLE ISOTOPE DERIVATIVE DILUTION ANALYSES FOR SELECTED FOOD ADDITIVES. Final rept.
R. L. Bogner, N. S. Domek, S. Eleftheriou, and J. J. Ross, Jr. 15 May 63, 105p
Contract AT(30-1)2715
OTS $2.25

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB-165 041
California Univ., Los Angeles.
A PRELIMINARY REPORT ON JOB SIMULATION RESEARCH. Rept. on Management Sciences Research Proj.
Yoshiro Kuratani and James McKenney. 12 Mar 58, 11p
[Contract Nonr-223(02)]
Discussion Paper no. 65; AD-218 703
OTS $1.60

DESCRIPTORS: Industrial research, *Simulation, Mathematical analysis, *Scheduling, *Industrial production,

Job-shop simulation research is reported. Attention is concentrated on the formulation of rules to schedule production efficiently. Various criteria of efficiency were investigated, such as maximum satisfaction of delivery commitments, maximization of machine utilization, minimization of in-process inventories, and minimization of processing cycles. The first factor, maximum satisfaction of delivery commitments, is the main concern. The general form of the optimizers considered is the following: $F = \sum_{i}^{K} \pi_i$; where π_i is the tardiness of job i, defined as max {completion-time due time, 0} ; and K is a parameter. (Author)

PB-165 040
California Univ., Los Angeles.
SCHEDULING A PRODUCTION LINE TO MINIMIZE MAXIMUM TARDINESS. Rept. on Management Sciences Research Proj.
James R. Jackson. 19 Jul 55, 37p
[Contract Nonr-223(02)]
Research rept. no. 43; AD-152 722
OTS $3.60

DESCRIPTORS: *Industrial production, Mathematical analysis, *Scheduling,

It is required to schedule the processing of Job-lots 1, 2, . . . , N through a production line, where: (A) the processing of Job-lot n cannot start before a given moment in time; (B) the processing of Jot-lot n requires a given amount of the production-line's time; and either (C_1) the processing of each job-lot can be distributed into any finite number of intervals of the production line's time, or (C_2) the processing of each job-lot must occupy one continuous interval of the production line's time. The objective is to choose a set of schedules containing solutions to all problems of minimizing nondecreasing functions of: (A) the maximum of the tardinesses of the items relative to given due-times, and (B) the time at which all of the required processing is completed. The problem with Hypothesis (C_1) is solved under broadly generalized conditions. The problem with Hypothesis (C_2) is reduced to a finite problem, and theorems are obtained to establish a computing procedure which has been efficient in numerous trial problem problems. Some related scheduling problems are examined, and a few applications outside the field of industrial production are suggested. (Author)

NASA-TM-X-935
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
ULTRASONIC WELDING OF A BERYLLIUM WINDOW ASSEMBLY
J. A. Munford, B. R. Cantor, and A. Piltch. Jan 64, 9p
N64-12956
OTS $0.50

NASA-TN-D-1988
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
AN EXPERIMENTAL INVESTIGATION OF GASEOUS-FILM COOLING OF A ROCKET MOTOR
James G. Lucas and Richard L. Golladay. Oct 63, 32p
N63-21895
OTS $0.75

Y-DA-470
Union Carbide Nuclear Co., Oak Ridge, Tenn.
TOOLING DEVELOPMENT FOR VERY HIGH PRESSURE PRESSING
R. P. Levey, Jr. and R. L. Huddleston. 6 Sep 63, 36p
Contract W7405-eng-26
OTS $0.75

MATERIALS

PB-165 043
American Science and Engineering, Inc., Cambridge, Mass.
PASSIVE INSTRUMENTATION DASA PROJECTS 823 AND 833.4, VOLUME II
Norman F. Harmon. Nov 60, 462p
Contract AF29(601)2322
AFSWC-TR-60-60(II)
OTS $23.50

DESCRIPTORS: *Lithium, *Beryllium, *Boron, *Carbon, *Aluminum, *Iron, *Nickel, *Copper, *Zinc, *Tin, *Platinum, *Gold, *Lead, *Nylon, *Polyester plastics, *Epoxy plastics, *Styrene plastics, *Polyethylene plastics, Physical properties

The volume consists of appendices to vol. 1. Included are: The fundamental physical constants; the physical properties of 13 elements; the thermal properties of 6 representative plastics; mass absorption coefficients of 18 materials; energy deposition curves for radiation from Planckian sources of 7 different temperatures for 18 materials. The materials concerned are: Li, Be, B, C, Al, Fe, Ni, Cu, Zn, Sn, Pt, Au, Pb, nylon, mylar, epoxy, polystyrene, polyethylene.

NASA-TN-D-2073
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
FRICTION, WEAR, AND DECOMPOSITION MECHANISMS FOR VARIOUS POLYMER COMPOSITIONS IN VACUUM TO 10^{-9} MILLIMETER OF MERCURY
Donald H. Buckley and Robert L. Johnson, Dec 63, 30p
N64-12105
OTS $0.75

PB-165 019
Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF A SYSTEM TO PROTECT AIRCRAFT PERSONNEL AND EQUIPMENT FROM INTENSE THERMAL RADIATION. Quarterly rept. no. 1, 3 Mar-2 Jun 59
W. C. Servoss and R. A. Foust. 16 Jun 59, 33p
Contract NOas-59-6112-c
AD-232 246
OTS $3.60

DESCRIPTORS: *Thermal radiation, *Infrared radiation, *Nuclear explosions, *Shielding, *Heat shields, *Coatings, *Aviation personnel, *Aircraft equipment, Protective coverings

The preparation of a visually transparent glazing material essentially opaque to infrared radiation, which will darken reversibly upon demand is investigated. In its role of restricting the transmission of thermal energy deriving from nuclear weapons, such a material would serve to protect personnel and equipment from deleterious exposure to high intensity thermal radiation. To the end of providing visual darkening under exposure to intense light radiation, several types of phototropic compounds have been prepared. The most active of these (cuminil phenylosazone) retained some of its phototropic character after casting in a thin film of methyl methacrylate. To provide opacity to infrared radiation, several approaches are being studied; the most promising of these appears to be absorption of the radiation more or less uniformly throughout a thickness of material sufficient to limit the adiabatic temperature rise to a value within the maximum permissible for the structural material used. (Author)

PB-165 018
Midwest Research Inst., Kansas City, Mo.
DEVELOPMENT OF A SYSTEM TO PROTECT AIRCRAFT PERSONNEL AND EQUIPMENT FROM INTENSE THERMAL RADIATION. Quarterly rept. no. 3, 3 Sep-2 Dec 59
W. C. Servoss. 2 Dec 59, 24p
Contract NOas-59-6112-c
AD-232 135
OTS $2.60

DESCRIPTORS: *Thermal radiation, *Infrared radiation, *Nuclear explosions, *Shielding, *Heat shields, *Coatings, *Phosphorescence, *Aviation personnel, *Aircraft equipment, Protective coverings

The preparation of a visually transparent material, essentially opaque to infrared radiation, which will darken reversibly upon demand is investigated. Such a material would serve to protect personnel and equipment from deleterious exposure to the radiant energy from a nuclear weapon. Studies of papers reporting investigations of the phototropic process and of the process of phosphorescence were continued. Brief searches were made for information about the crystal structure of phototropic compounds and about present concepts of the nature of the solid state. Measurements of the reflectance of pure phototropic materials have shown that, in some instances, the color change produced by ultraviolet irradiation may be reversed quickly by brief exposure to infrared. (Author) (See also PB-165 019)

Ceramics and Refractories

AD-295 683

Aerojet-General Corp., Sacramento, Calif.
EVALUATION OF C-6 AND C-9 CEMENTS FOR JOINING GRAPHITE. Rept. for 1 Oct-31 Dec 62, on Phase I 15 Jan 63, 26p
Contract AF33(657)8890
OTS $2.60

DESCRIPTORS: *Cements, Mechanical properties, *Refractory materials, *Graphite, *Bonding, Rocket components.

Two graphite adhesives were evaluated for mechanical and physical properties. Processing procedures were established for the C-6 and C-9 cements which are used principally for bonding graphite and carbon structural shapes in high temperature applications. On the basis of the tests performed, it was established that the C-9 cement was generally superior to the C-6 cement for joining graphite. (Author)

GEMP-29A
General Electric Co., Cincinnati, Ohio.
HIGH-TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 29, Part A. 30 Nov 63, 82p
Contract AT(40-1)2847
OTS $2.00

GEMP-30A
General Electric Co., Cincinnati, Ohio.
HIGH-TEMPERATURE MATERIALS PROGRAM. Progress rept. no. 30, Part A. 31 Dec 63, 36p
Contract AT(40-1)2847
OTS $0.75

N64-13267
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
STRUCTURAL AND HIGH-TEMPERATURE TENSILE PROPERTIES OF BORON PYROLYTIC GRAPHITE
W. V. Kotlensky and H. E. Martens. 16 Dec 63, 15p
Contract NAS7-100
Technical rept. no. 32-299; NASA CR-53013
OTS $1.60

AD-274 027
Ohio State Univ. Research Foundation [Columbus].
SURVEY AND FUTURE TRENDS OF GRAPHITE TECHNOLOGY. Rept. for Nov 60-Apr 61, on Materials Applications
E. J. Dunn. Feb 62, 46p
Contract AF33(616)6288
ASD-TR-61-353
OTS $4.60

DESCRIPTORS: *Graphite, Physical properties, Density, Anisotropy, Hot working, Oxidation, Non-destructive testing, Rocket components.

A survey of the various graphites, in view of advances during the past three years, is presented. The various claims, properties and processes of graphites are analyzed to assess their practicality, reliability, and reproducibility. The properties of graphite are discussed and compared to aid the decision-making designers in understanding the potential of graphites with regard to missile and space applications. Emphasis is placed on the need for more co-operation between the designer and materials engineer in view of the belief that graphites should not be treated as a "shelf" material, but as a family of unique materials. Likely trends in graphite development are pointed out and suggestions for advanced courses of development are mentioned. (Author)

AD-281 238

Raytheon Co., Waltham, Mass.
HIGH TEMPERATURE MATERIALS DEVELOPMENT. Monthly progress rept. no. 29 for May 62 15 Jun 62, 12p
Contract NOrd 19135 (FBM)
S-435
OTS $1.60

DESCRIPTORS: *Refractory materials, *Graphite, *Zirconium alloys, Carbides, *Laminates, Mechanical properties, Rocket components.

The flexural strength of a laminar structure comprised of alternate layers of Pyrocarbide and Pyrographite is found to be equal to that of Pyrocarbide - the stronger component. In a carbon rich alloy of zirconium Pyrocarbide, the strength is 92.9×10^3 psi, about four times stronger than Pyrographite and twice as strong as cast iron. Tests are continuing to determine if these high strengths are reproducible and can be increased more by compositional changes. (Author)

Fuels, Lubricants, and Hydraulic Fluids

PB-165 094
American Potash and Chemical Corp., Whittier, Calif.
DEVELOPMENT OF MANUFACTURING PROCESSES FOR HIGH TEMPERATURE LUBRICANT AND HYDRAULIC FLUID BASE STOCKS. Final technical engineering rept., 4 Nov 57-13 Nov 59
W. D. Peterson, R. W. Baier, and J. P. Miller. Nov 60, 395p
Contract AF33(600)36237
AMC TR 60-7-655; AD-249 030
OTS $21.00

DESCRIPTORS: *Lubricants, Hydraulic fluids, *Silanes, *Heat-resistant materials, *Benzyl radicals, *Ethers, Phenoxy radicals, Phenyl radicals, Synthesis (Chemistry), Manufacturing methods,

A pilot plant process is described for the manufacture of n-dodecyl tri(n-decyl) and n-hexadecyl tribenzyl silane fluid stocks. It was decided that the best route was to condense $SiCl_4$ with the appropriate alkylmagnesium halide. This process was developed in the laboratory to give an over-all yield of at least 30% of tetraalkyl silane fluid of 95% purity. A multi-purpose pilot plant was designed and constructed to manufacture these fluids. The laboratory processes were proven out successfully in the pilot plant. The capacity of this plant was 3 to 20 gallons per day, depending on product purity. In the pilot plant it was shown that a wipe film

evaporator was the most versatile unit for rectifying these high boiling fluids. By the use of superheated steam in connection with it, it was possible to separate trialkyl silane hydride and most of the hexaalkyl disiloxane impurities. On the basis of the data collected in the pilot plant, a full-scale production unit has been designed. Specifications for raw materials and plant operation are included. By means of a nine-stage process, bis(m-phenoxyphenyl) ether was prepared in very high purity and free of isomeric products in the laboratory. (Author)

N64-13283
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SOME EXPERIMENTAL AND THEORETICAL SIGNIFICANCES ASSOCIATED WITH IRRADIATED PROPELLANT
Anthony San Miguel and Edward N. Duran. 1 Nov 63, 17p
Contract NAS7-100
Technical rept. no. 32-518; NASA CR-53012
OTS $1.60

AD-268 442

North Carolina State Coll., Raleigh.
LUBRICATION BEHAVIOR OF LIQUID METALS.
Rept. for 1 Oct 59-31 Dec 60, on Surface and Interface Phenomena of Matter
Patrick H. McDonald and John K. Whitfield. May 61, 58p
Contract AF33(616)5885
WADD Technical rept, 61-47
OTS $5.60

DESCRIPTORS: *Liquid metals, *Journal bearings, Design, *Lubrication, *Hydrodynamics, Boundary layer.

The analysis presented for a finite length full-journal bearing is based on the hydrodynamic theory of lubrication developed by Reynolds (1886). A finite-difference relaxation procedure is obtained by machine computation. Solutions are obtained for the pressure distribution over the bearing area for various eccentricities in the hydrodynamic range. From the numerical results a simplified journal-bearing design criterion is established. The report surveys the progress in the check out and assembly of the hydrodynamic lubrication test apparatus. A discussion of the apparatus designed and built to study the boundary lubrication properties of liquid metals is given. (Author) (See also PB 161 888)

Plastics

AD-284 204
Institute of Rubber Research, Univ. of Akron, Ohio.
MOLECULAR STRUCTURE AND PHYSICAL BEHAVIOR OF POLYMERS. Interim rept., 1 Feb 61-1 Feb 62, on Fundamental Research on Macromolecular Materials and Lubrication Phenomena
M. Morton, A. Gent, S. D. Gadkary, and T. E. Helminiak. May 62, 38p
Contract AF33(616)6965
ASD-TR-61-16, Part II
OTS $3.60

DESCRIPTORS: *Styrene plastics, *Molecular structure, Stresses, Vulcanizates, Butyl rubber, Lithium compounds, Silicon compounds, Chlorides,

Model branched polymers were prepared by the reaction of relatively monodisperse polystyryl lithium with silicon tetrachloride. A study of the dilute solution properties of the branched molecules confirmed the theoretical development of the branching coefficient, g', by Zimm and Kilb. The second virial coefficient, A_2, was found to decrease with increased branching. In addition, the Huggins constant, k', was found to be a poor measure of branching in molecules. A study was carried out on the effect of polymerization temperature and age of active anionic polystyrene on its molecular weight. Results showed that, at least up to 70° C, neither polymerization temperature nor polymer aging had any appreciable effect on the polymer. Furthermore, analytical tests failed to detect the presence of equilibrium monomer at 70°C, at least down to 0.5% concentration, based on polymer. Stress relaxation measurements were carried out at room temperature using vulcanizates of butyl rubber and natural rubber.

AD-401 757
Institute of Rubber Research, Univ. of Akron, Ohio.
MOLECULAR STRUCTURE AND PHYSICAL BEHAVIOR OF POLYMERS. Final rept., 1 May-31 Dec 62, on Fundamental Research on Macromolecular Materials and Lubrication Phenomena
M. Morton, A. Gent, and S. D. Gadkary. Feb 63, 43p
Contract AF33(616)6965
ASD-TR-61-16, Part III
OTS $4.60

DESCRIPTORS: *Polyethylene plastics, Radiation chemistry, Gamma rays, *Molecular structure, Thermal stresses, Crystallization, Polymers

Crosslinked polyethylene films have been prepared by gamma irradiation of molten linear polyethylene in vacuo. The stress-temperature relations at constant length have been determined, both for these materials and for crosslinked balata (trans-polyisoprene). The stress changes under isothermal conditions have also been studied. Dilatometric studies have been started. Evidence for folded-chain or oriented-bundle crystallization is afforded by the stress changes. The former seems less pronounced in balata; it is eliminated by incomplete melting. (Author) (See also AD-284 204)

NASA-TN-D-2010
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
CALCULATION OF ELECTRON ENERGY DEPOSITION IN THIN-FILM POLYMERIC MATERIALS
Louis A. Teichman and Ernest S. Armstrong. Oct 63, 11p
N63-21896
OTS $0.50

AD-282 790
Narmco [Industries, Inc.] San Diego, Calif.
HIGH TEMPERATURE RESINS. ANALYSIS OF PROCESS PARAMETERS, AND EVALUATION PROCEDURES FOR FILAMENT WOUND COMPOSITES. PART III. EVALUATION PROCEDURES. Final rept., 13 Jul 59-31 Dec 60, on Nonmetallic and Composite Materials
S. Yurenka, H. S. Daley, and T. Siuta (Walter Kidde and Co.) Jun 62, 256p
Contract AF33(616)6737
WADD-TR-60-791, Pt. III
OTS $16.50

DESCRIPTORS: *Heat resistant plastics, Machines, *Filament wound construction, Mechanical properties, Test methods, Statistical data, *Composite materials, *Glass textiles.

The objective of the program was to determine the most significant basic mechanical properties of filament wound composites, and to provide optimum standardized test methods and procedures for defining them at both room and elevated temperatures. The program also included the design and fabrication of a versatile laboratory filament winding machine to fabricate these specimens. An account of the various test specimen configurations considered is presented, along with a detailed discussion of those actually evaluated. The evolution and development of the various test configurations are described and construction details for each of the evaluation procedures are presented by drawings. The most satisfactory evaluation procedures for each mechanical property were determined on the basis of the data obtained. A standard cylindrical specimen was designed, from which all of the basic mechanical properties could be obtained. Detailed fabrication instructions for producing the basic specimen and some of its variations were determined. (See also AD-291 897)

Rubber and Elastomers

PB-165 035
Defense Research Lab., Univ. of Texas, Austin.
INVESTIGATION OF THE BEHAVIOR OF VIBRATION ISOLATORS
R. P. Felgar, W. H. Hartwig, and W. A. Shaw. Jul 52, 151p
[Contract NOrd-9195]
DRL rept. no. 302; APL rept. no. CM-713; AD-11 922
OTS $11.50

DESCRIPTORS: *Rocket components, *Vibration isolators, Mounting brackets, Hysteresis, Damping, *Elastomers, *Rubber, *Synthetic rubber, *Silicone plastics, Mechanical properties,

An investigation was made of the use of vibration isolators under the conditions present during the motion of a guided missile, and the vibrational operation of the mount was studied. Transmissibilities less than 2 for 0-100 c and less than 1 for 100-2000 c were considered as the isolation to be effected by the mounts. Experiments were performed in which the mounts acted as both linear and nonlinear devices. The damping coefficients of the isolators were measured from both free decay and forced vibration tests. Since the active elements of the vibration isolators studied are elastomers, which exhibit pronounced hysteresis effects, it is necessary to differentiate between the static and the dynamic moduli. The static modulus was used as a measure of the stiffness of the isolator in making analytical vibration studies of the mounts. A 1-degree-of-freedom system was used with the amplitude of excitation varied to study vibration in both the linear and nonlinear range. The linear forced vibrations are used as a means of comparing static and dynamic moduli and computing damping coefficients, and serves as a starting point for nonlinear experiments. Results are given for experiments performed on a 6-degree-of-freedom system intended to simulate the mass distribution and isolator location under service conditions. Elastomers of 4 different materials, rubber, buna, neoprene, and silicone rubber, were studied. (DDC abstract)

AD-290 757
Resin Research Labs., Inc., Newark, N. J.
SYNTHESIS OF ADDITIVES FOR IMPROVING HEAT STABILITY OF ELASTOMERIC VULCANIZATES. Rept. no. 2
Alan E. Weinberg and Roy H. Cook. 1 Nov 62, 79p
Contract DA11-070-508-ORD-1200
N63-16194
OTS $7.60

DESCRIPTORS: *Heat resistant materials, *Elastomers, *Vulcanizates, *Synthetic rubber, *Silicone plastics, *Halocarbon plastics, *Fluorocarbons, *Dienes, Stabilization, *Metalorganic compounds *Chelate compounds, *Nickel compounds, *Cobalt compounds, * *Oximes, Ethyleneamines, *Cresols, *Quinolines, *Amides, Thio radicals, Benzyl radicals.

The objective of the work was to synthesize chemicals not commercially available which would function to increase the heat stability of various types of elastomers. Specifically, silicone, fluorocarbon and diene elastomers were evaluated. Two classes of compounds were selected for synthesis: 1) derivatives of dithiooxamide and, 2) organometallic chelates. Addition of these materials to the test elastomers followed by vulcanized and heat aging showed the following results: (1) of the thirty-seven derivatives of dithiooxamide prepared, only two - N, N'bis (hydroxyethyl) dithiooxamide cobalt (II) and N, N'dibenzyl-dithiooxamide cobalt (II) - showed any significant activity as high temperature stabilizers and then only when used with fluoroelastomers; (2) nickel chelates of benzoin oxime and ethylene-diamine-o-cresol in admixture with pentaerythritol and a proprietary amine when compounded in sulfur cured SBR vulcanizates displayed better resistance to degradation during exposure at 300°F than did the control. (3) cobalt and nickel chelates of 8 hydroxy-quinoline appear to provide protection for fluoroelastomers during a twenty-four hour exposure at 600°F; however, these stabilizers lose their effectiveness when the exposure is extended to forty-eight hours. (Author)See also AD-268 271)

MATHEMATICS

NASA-TN-D-2126
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
NUMERICAL PREDICTIONS OF NONLINEAR DIFFUSION WITH HOMOGENEOUS RECOMBINATION AND TIME-VARYING BOUNDARY CONDITIONS
Walter A. Reinhardt, Jan 64, 38p
N64-12688
OTS $1.00

NASA-TN-D-2128
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
ON THE DIRECT SOLUTION OF THE GOVERNING EQUATION FOR RADIATION-RESISTED SHOCK WAVES
Walter E. Pearson, Jan 64, 18p
N64-12690
OTS $0.50

TID-15885
Argonne National Lab., Ill.
RANDOM PATHS ON PLANE NETS WITH INTERNAL TRAPS
G. L. Montet. Apr 62, 20p
Contract W31-109-eng-38
UAC-6281
OTS $1.60

N64-13275
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DETERMINATION AND CHARACTERISTICS OF BALLISTIC INTERPLANETARY TRAJECTORIES UNDER THE INFLUENCE OF MULTIPLE PLANETARY ATTRACTIONS
Michael A. Minovitch. 31 Oct 63, 69p
Contract NAS7-100
Technical rept. no. 32-464; NASA CR-53033
OTS $6.60

N64-13281
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A DYNAMIC PROGRAMMING ANALYSIS OF MULTIPLE GUIDANCE CORRECTIONS OF A TRAJECTORY
Carl G. Pfeiffer. 15 Nov 63, 20p
Contract NAS7-100
Technical rept. no. 32-513; NASA CR-53000
OTS $1.60

N64-13279
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SYSTEMATIC STATISTICS USED FOR DATA COMPRESSION IN SPACE TELEMETRY
Isidore Eisenberger and Edward C. Posner. 1 Oct 63, 48p
Contract NAS7-100
Technical rept. no. 32-510; NASA CR-53031
OTS $4.60

N63-21995
Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
A TECHNIQUE FOR CALCULATING SMOOTHING AND DIFFERENTIATION COEFFICIENTS
John P. Sheats and Jon B. Haussier. 26 Sep 62, 28p
MTP-AERO-62-71; NASA TM X-50287
OTS $2.60

Computing Devices

IS-769
Ames Lab., Iowa State Univ. of Science and Tech.
POGO REFERENCE MANUAL
D. R. Fitzwater, E. H. Hietbrink, M. M. Ledet, D. E. McFarland, and C. E. Runge. Nov 63, 54p
Contract W7405-eng-82
OTS $1.25

IS-765
Ames Lab., Iowa State Univ. of Science and Tech.
SCANF MACRO FOR THE IBM 7070/2/4
T. R. Johnston. Nov 63, 16p
Contract W7405-eng-82
OTS $0.50

ANL-6697
Argonne National Lab., Ill.
A PRIMER ON THE ACT-III COMPILER FOR THE LGP-30 DIGITAL COMPUTER
H. C. Thacher, Jr. and R. E. Granch. Oct 63, 94p
Contract W31-109-eng-38
OTS $2.00

N63-21904
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN ULTRA HIGH-SPEED LOW-COST PRINTER SYSTEM
J. A. Newnham. 8 Aug 63, 13p
Contract NAS7-100
Technical rept. no. 32-465; NASA CR-51310
OTS $1.60

LAMS-2986
Los Alamos Scientific Lab., N. Mex.
SWITCHING CIRCUIT ANALYSIS PROGRAM SCAP-1
Lewis F. Green. 22 Oct 63, 15p
Contract W7405-eng-36
OTS $0.50

PB-165 034
Naval Ordnance Lab., White Oak, Md.
DELAY LINE TIME COMPRESSOR XT-1A
John C. Munson and Lester E. Barton. 6 Sep 56, 66p
NAVORD rept. 4244; AD-115 331
OTS $6.60

DESCRIPTORS: *Data processing systems, Design, Circuits, Delay lines, Integrators, Control systems,

The report discusses briefly the relative advantages of several types of data processing systems but is mostly concerned with the development of the NOL Delay Line Time Compressor (DELTIC) XT-1A. The XT-1A is a

sampling system which stores digital information in a number of DELTIC channels and then processes the data by the polarity coincidence correlation method. The DELTIC and control circuits are discussed both from a philosophic and a circuit-wise point of view. Block diagrams, schematics, component layouts, and photographs are given of the various portions of the system. Photographs are shown of typical waveforms including the output of the correlator for a number of different signal conditions. (Author)

IDO-16867
Phillips Petroleum Co., Idaho Falls.
HEAT 1: A ONE DIMENSIONAL TIME DEPENDENT OR STEADY STATE HEAT CONDUCTION CODE FOR THE IBM-650
K. J. Wagner. 22 Apr 63, 76p
Contract AT(10-1)205
OTS $1.75

IDO-16904
Phillips Petroleum Co., Idaho Falls.
INHOUR, AN IBM-7090 CODE FOR THE COMPUTATION OF THE ROOTS OF THE INHOUR EQUATION
H. A. Larson and W. A. Christenson. 20 Aug 63, 49p
Contract AT(10-1)205
ORS $1.25

PB-165 036
RCA Industrial Electronic Products, Camden, N. J.
MICROWAVE CIRCUITS AND INTERCONNECTION DEVICES, VOLUME 5. Final research rept., phase 1, 1 Jul 57-31 Dec 58, on High-Speed Data Processing System. Project Lightning [1958] 178p
Contract NObsr-72717
AD-227 834
OTS $12.50

DESCRIPTORS: *Data processing systems, *Computer systems components, *Microwave networks, Oscillators, Oscillator circuits, Diodes (Semiconductor), Crystal oscillators, Design, Computer logic,

Contents:
Properties of the parametric phase-locked oscillator
Possible memory and logic applications of the parametric phase-locked oscillator
Crystal-diode microwave parametric oscillators
A figure of merit for semiconductor diodes used in parametric subharmonic oscillator circuits
Strip-line circuits for microwave logic

AD-297 818
Remington Rand Univac Div., Sperry Rand Corp., St. Paul, Minn.
PROJECT LIGHTNING. Quarterly progress rept. no. 7, Volume 2, Phase 3, 1 Dec 61-28 Feb 62
Robert W. Olmen and Sidney M. Rubens. [1962] 97p
Contract NObsr 77521
Rept. no. PX 1599-7
OTS $8.60

DESCRIPTORS: *Data processing systems, *Digital computers, *Computer storage devices, Ferromagnetic materials, *Thin films (Storage devices), *Vapor plating, Thickness, Magnetic properties, *Tunnel diodes, *Transistors, *Clocks, *Computer logic, *Transmission lines, *Magneto-optic effect. Topic include: film core program (Film Deposition, thickness measurements, magnetic measurements, applications); mathematics and logic research (scrambling matrixes, system studies); lightning test machine coupled transmission lines, film testing with Kerr magneto-optic apparatus); angular dispersion and its relationship with other magnetic parameters in permalloy films. (See also AD-273 748)

SC-4944(RR)
Sandia Corp., Albuquerque, N. Mex.
THE SANDIA APAR-3G SYSTEM: AUTOMATIC PROGRAMMING, RECORDING, AND CONTROL FOR DEVELOPMENT AND PRODUCTION TESTING
R. W. Roberts. Dec 63, 33p
Contract AT(29-1)789
OTS $0.75

Y-1371
Union Carbide Nuclear Co., Oak Ridge, Tenn.
THE APPLICATION OF DATA PROCESSING TECHNIQUES TO A MAINTENANCE WORK CONTROL PROGRAM
J. D. Westbrook. 7 Aug 63, 156p
Contract W7405-eng-26
OTS $2.75

MECHANICS

AD-417 443
Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio
THE EFFECT OF STRESS DISTRIBUTION ON THE FATIGUE BEHAVIOR OF ADHESIVE BONDED JOINTS. Final rept., Mar 59-Jul 61 on Metallic Materials
D. Y. Wang. Jul 63, 35p
ASD-TDR-63-93; N63-21426
OTS $1.00

DESCRIPTORS: *Adhesives, *Stresses, *Bonded joints, Joints, *Fatigue (Mechanics), *Failure (Mechanics), *Aluminum alloys, *Rubber adhesives, Nitrile rubber, Phenolic plastics.

A study was made of the fatigue behavior of three types of 2024-T3 aluminum alloy adhesive bonded joints, single lap-joint, scarf-joint and butt-joint, bonded with two kinds of adhesives, a vinyl-phenolic type-FM 47 and a nitride rubber-phenolic type-Metlbond 4021. It was found that the different modes of fatigue failures of the single lap-joints, that is, sheet metal failure, and adhesive bonding failure, were caused by the different stress components in the joint. The influence of the variation of stress distribution caused by the difference in mechanical properties of the adhesive, geometry of the joints, and the type of loading on fatigue strength of the adhesive bonded joints, were analyzed. (Author)

PB-165 078
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
THE CALCULATION OF THE COMPLEX MODULUS OF LINEAR VISCO-ELASTIC MATERIALS FROM VIBRATING REED MEASUREMENTS. Technical rept. no. 9
D. R. Bland and E. H. Lee. Jan 55, 29p
Contract NOrd-11496
Rept. no. PA-TR/9; AD-94 051
OTS $2.60

DESCRIPTORS: *Vibrators (Mechanical), Models (Simulations), Materials, *Plastics, *Propellants, Mechanical properties, Test methods, Differential equations,

Two methods of determining the variation of real and complex modulus with frequency from vibrating reed test results are detailed. One is based on measurements of the relative amplitude and phase lag of the motion of the free and driven ends of the reed, the other on amplitude resonance measurements only. The analysis is based on a general linear visco-elastic law, and takes into account the influence of the frequency dependent moduli of the material on the frequency and amplitude of the resonance peaks. This influence has not been correctly accounted for in previous analyses which have included the assumption that the material behaves according to a particular simple visco-elastic law, which will in general not be borne out by the final results. (Author)

AD-273 894
Douglas Aircraft Co., Inc., Santa Monica, Calif.
FATIGUE PREDICTION STUDY. Rept. for 1 Mar 60-28 Feb 61, on Structural Design Criteria
G. V. Deneff. Jan 62, 226p
Contract AF33(616)6901
WADD TR 61-153; N62-10953
OTS $15.00

DESCRIPTORS: *Fatigue (Mechanics), *Stresses, *Structural parts, Sheets, Damage, Graphic analysis, Aircraft materials.

Fatigue life prediction of complex structure is investigated from the standpoint of fundamental factors that influence the prediction; namely, stress, fatigue strength, and damage method. Stresses developed by a general stress analysis procedure are combined with appropriate fatigue strength data to estimate the fatigue strength of a structural joint. Factors influencing the joint fatigue strength under spectrum conditions are analyzed and a method of estimating this fatigue strength is presented. Damage methods utilizing several types of fatigue strength data are considered. The influence of geometric factors on the fatigue strength of basic material is also studied and presented in a normalized form. (Author)

N64-13276
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THERMOELASTIC ANALYSIS OF A PARABOLIC SHELL
G. S. Stern. 1 Aug 63, 17p
Contract NAS7-100
Technical rept. no. 32-479; NASA CR-53007
OTS $1.60

AD-261 008
Martin [Marietta Corp.] Baltimore, Md.
TIME-DEPENDENT, ELASTO-PLASTIC BENDING ANALYSIS FOR STRUCTURES UNDER ARBITRARY LOAD-TEMPERATURE ENVIRONMENTS. PART I. ANALYSIS DEVELOPMENT AND DIGITAL PROGRAM. Rept. on Structural Design Criteria
P. C. Huang. Apr 60, 60p
Contract AF33(616)6436
Rept. no. RR-16; WADD Technical rept. 60-541, Part I
OTS $5.60

DESCRIPTORS: *Airframes, *Beams (Structural), Structures, Mathematical analysis, Thermal stresses, Thermal expansion, Creep, Elasticity, Plasticity, Loading (Mechanics), *Programming (Computers),

This report presents a method and digital program for calculating time-dependent stress-strain relationship in an unevenly heated beam-type structure. Thermal stresses, creep stresses and/or residual stresses can be analyzed in elastic, elasto-plastic or plastic range. Applied loads and temperatures can be arbitrary with time. A limited study of sequential effects of the load-temperature application on a plate is performed. The present analysis method, originally programmed for the IBM-704 digital computer, has been adapted for use with the IBM-709. (Author)

PB-165 051
Minnesota Univ. [Minneapolis].
EFFECT OF MATERIAL DAMPING AND STRESS DISTRIBUTION ON THE RESONANT FATIGUE STRENGTH OF PARTS. Rept. for Jan 54-Aug 55, on Materials Analysis and Evaluation Techniques
Egons R. Podnieks and Benjamin J. Lazan. Aug 55, 67p
Contract AF33(038)20840
WADC Technical note 55-284
OTS $6.60

DESCRIPTORS: *Applied mechanics, Materials, *Resonance, Vibration, *Fatigue (Mechanics), *Damping, Stresses, Graphic analysis.

The behavior of various types of parts under resonant vibrations is reviewed considering material hysteresis as the only form of damping present. Three different criteria are introduced for comparing materials and parts for resonant operation: total damping - D_d α, resonance amplification factor - A_r (A'_r), and resonance exciting stress - S_g (S'_g). Graphical and analytical procedures are derived for determining the unitless damping energy α and the unitless elastic strain energy β. Both relate the effect of the shape of the part and the stress distribution to the resonant behavior of a part. The relationship of stress distribution to the shape of the damping energy curves and the resultant effect on the above criteria is discussed. The influence of the cyclic stress history on resonant behavior is also indicated. In comparative examples the relative merits of five different types of structural materials (type 403 alloy, titanium - RC55 annealed, RC55 cold-worked, RC130B, and glass fabric laminate) based on above criteria are discussed in connection with application to various types of parts. Resonant fatigue curves are introduced and discussed for the same examples. (Author)

N64-13008
Syracuse Univ. Research Inst., N. Y.
NOISE INVESTIGATIONS WITH IMPINGING JET FLOWS. Status rept. no. 1, 1 Jun-30 Nov 63
Darshan S. Dosanjh. Dec 63, 10p
Grant NsG-431
Report no. ME 1085-63111; NASA CR-55144
OTS $1.10

Aerodynamics and Pneumatics

PB-165 053
Aerojet-[General] Corp., Azusa, Calif.
LOW-SPEED-FLIGHT RESEARCH PROGRAM ANALYSIS REPORT. SERIES II. WIND TUNNEL TESTS
J. Golden, W. C. House, and H. U. Johansen. 13 Jun 51, declassified 5 Nov 53, 68p
Contract N7onr-46206
Rept. no. 509; AD-467
OTS $6.60

DESCRIPTORS: Subsonic characteristics, *Wind tunnels, Tests, *Aerodynamic control surfaces, Airfoils, *Aerodynamic characteristics, Aerodynamic data.

Data from the wind-tunnel tests on the circulation control system were analyzed. The model was compartmented so that the chordwise distribution of suction velocity, recorded from hot-wire anemometers in the model, was capable of wide variation. A maximum panel-lift coefficient of 7.37 was obtained with a quantity-flow coefficient of 0.11, which represented an improvement in maximum lift of 23% for a quantity-flow coefficient 76% of that required in the Series 1 wind-tunnel tests. Investigation of various flap, surface, and flow parameters was continued. Aerodynamic characteristics were insensitive to surface conditions because of the favorable effect of the suction on boundary-layer stability. (DDC abstract)

PB-165 086
[Aeronautical Systems Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.].
A STATISTICAL SURVEY OF THE FLUTTER OF AIRPLANE CONTROL SURFACES
Benjamin Smilg. 11 Dec 40, 22p
Technical rept. no. 4595; ATI-21 273
OTS $2.60

DESCRIPTORS: *Aerodynamic control surfaces, *Flutter, Statistical analysis, *Aeroelasticity

A statistical survey is presented of the flutter of airplane control surfaces based on flight experiences and model tests. Also an analysis of the available data on flutter together with a comparison of the results with present control surface flutter criteria of the Materiel Division are discussed. The results are interpreted in terms of a flutter parameter similar to the "reduced frequency." The data presented graphically shows the dependence of flutter parameter upon the degrees of control surface dynamic balance needed to prevent flutter. (Author)

NASA-TN-D-2066
Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
EVALUATION OF A CONSTRICTED-ARC SUPERSONIC JET
Charles E. Shepard, Velvin R. Watson, and Howard A. Stine. Jan 64, 38p
N64-12717
OTS $1.00

PB-165 096
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
INVESTIGATIONS OF THE AIR LOAD DISTRIBUTIONS ON A STABILIZING FIN AT MACH NUMBERS 1.5, 2.0, AND 2.5
S. R. Pate and J. H. Jones. Dec 61, 26p
Contract AF40(600)800
AEDC-TN-61-167
OTS $2.60

DESCRIPTORS: *Aerodynamic control surfaces, Airfoils, *Fins, *Stabilizers (Horozontal tail surfaces), Loading (Mechanics), *Flutter, Supersonic flow,

Force tests were conducted in the 40-in. Supersonic Tunnel of the von Karman Gas Dynamics Facility to determine the aerodynamic characteristics of a segmented stabilizing fin having an isosceles trapezoidal planform area. The models were cambered and uncambered fins composed of six individual segments which were supported from a main spar by internal strain-gage balances. From these two basic models, a total of ten configurations was tested to determine the air load distribution along the fin span arising from various individual segment deflections and fin twist. The tests were conducted at Mach numbers 1.5, 2, and 2.5 for a Reynolds number range from 0.16 to 0.48 million per in. with an angle-of-attack range from zero to 4 deg. (Author)

PB-165 037
Ballistic Research Labs., Aberdeen Proving Ground, Md.
MAGNUS EFFECT IN THE CASE OF ROTATING CYLINDERS AND SHELLS
William E. Buford. Jul 54, 51p
Memo. rept. no. 821
OTS $5.60

DESCRIPTORS: *Bodies of revolution, *Cylindrical bodies, *Structural shells, Aerodynamic characteristics, Boundary layer

The circulation velocity about a cylinder in a two-dimensional flow was calculated with the aid of measurements from flow photographs. The computed Magnus force agreed within about fifteen per cent, or less, with wind tunnel experimental values. An attempt is made to predict the Magnus force on a yawed spinning body (shell) with the aid of available two-dimensional information. It appears that the boundary layer equations, modified to consider surface movement, may be used to predict theoretically the circulation velocity from knowledge of the position and velocities at separation. Explanations are presented for negative Magnus force, and the increase in Magnus force when a surface is roughened is considered. Some effects of Magnus force on the flight of spinning objects are discussed. Suggestions are made for further methods of attack on the Magnus force problem. (Author)

AD-407 983
Defense Research Lab., Univ. of Texas, Austin.
THE EXPERIMENTAL EVALUATION OF THE SURFACE IMPACT PROBE TECHNIQUE OF MEASURING LOCAL SKIN FRICTION UNDER CONDITIONS OF MODERATE HEAT TRANSFER. Technical rept.
Jim King Davidson (Master's thesis). Jun 61, 63p
Contract NOrd-16498
DRL-468; CF-2931
OTS $6.60

DESCRIPTORS: *Aerodynamic heating, *Heat transfer, Adiabatic gas flow, Supersonic flow, Flat plate models, Friction,

The surface impact probe method of measuring local skin friction was evaluated for the case of moderate heat transfer in supersonic flow by means of tests on a flat plate model in an intermittent flow, high stagnation temperature wind tunnel at a nominal Mach Number of 4.95. Data from tests conducted under both adiabatic and heat transfer conditions were obtained. The results from these tests were found to exhibit a constant deviation from theory. The adiabatic results were seen to exhibit the same deviation as the heat transfer results. Some test data were obtained under near-adiabatic conditions, but with the plate transferring a slight amount of heat to the air flow. These data produced results that exhibited a small, additional constant deviation from theory. An empirical correction factor is presented to remove the deviation from all the experimental results. (Author)

NASA-TN-D-2241
Flight Research Center, National Aeronautics and Space Administration, Edwards, Calif.
COMPARISON OF FLIGHT PRESSURE MEASUREMENTS WITH WIND-TUNNEL DATA AND THEORY FOR THE FORWARD FUSELAGE OF THE X-15 AIRPLANE AT MACH NUMBERS FROM 0.8 TO 6.0
Jon S. Pyle. Jan 64, 31p
N64-12961
OTS $0.75

AD-403 000
Giannini Controls Corp., Berwyn, Pa.
NUMERICAL APPROXIMATION METHOD FOR FLEXIBLE FLIGHT VEHICLE TRANSFER FUNCTION FACTORS. Final rept., 1 Feb 61-15 Mar 62
F. J. Frueh and M. B. Zisfein. Mar 63, 116p
Contract AF33(616)7906
ASD-TDR-62-1063
OTS $9.60

DESCRIPTORS: *Airframes, Airfoils, *Aeroelasticity, Functions, Equations of motion, *Flutter.

The report presents the development of a method to approximate numerical transfer function factors of a flexible flight vehicle. In the approach of the method, the flexible flight vehicle system is replaced by an artificial system which is the flight vehicle system constrained in a manner to facilitate solution. The solutions of this artificially constrained system are then readily transformed into good approximate solutions to the transfer functions of the actual flexible flight vehicle. The method utilizes electronic digital computation which permits the analyst great freedom in the choice of definition and precision of his flight vehicle system. The method further permits the incorporation into all modes of presently-tabulated sustained-oscillation unsteady--aerodynamic coefficients and avoids the necessity of defining aerodynamic terms for decaying oscillations. It thus surmounts many of the obstacles presented by the mathematical complexities of non-oscillatory aerodynamics, by a great number of degrees of freedom, and by structural definition of low aspect ratio surfaces. Several numerical examples of the application of the approximation method are presented, and comparison with "exact" solutions demonstrates good correlation. (Author)

NASA-TN-D-2058
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
APPROXIMATE CALCULATION OF HYPERSONIC CONICAL FLOW PARAMETERS FOR AIR IN THERMODYNAMIC EQUILIBRIUM
Perry A. Newman. Jan 64, 17p
N64-12716
OTS $0.50

NASA-TN-D-2057
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
STATIC LONGITUDINAL CHARACTERISTICS OF THE PROJECT FIRE REENTRY STAGE AFTER REENTRY-PACKAGE SEPARATION AT MACH 28.3 IN HELIUM
Curtis D. Snyder, Jan 64, 21p
N64-12959
OTS $0.50

NASA-TN-D-1958
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
TRANSONIC WIND-TUNNEL INVESTIGATION OF THE STATIC AERODYNAMIC CHARACTERISTICS OF SEVERAL CONFIGURATIONS OF THE BLUE SCOUT LAUNCH VEHICLE
Thomas C. Kelly and Robert J. Keynton. Sep 63, 43p
N63-21891
OTS $1.25

N64-13192
Michigan Univ., Ann Arbor. Coll. of Engineering
DEFORMATION AND STRESS IN AN INFLATED AIRCRAFT TIRE. Technical rept. no. 1
S. K. Clark, R. N. Dodge, J. T. Tielking, and B. Herzog. Oct 63, 64p
Grant NsG-344
ORA proj. 05608; NASA CR-55174
OTS $6.60

PB-165 021

Naval Ordnance Lab., White Oak, Md.
A NEW GENERAL FORMULA FOR REPRESENTING THE DRAG ON A MISSILE OVER THE ENTIRE RANGE OF MACH NUMBER
Daniel Shanks and Thomas S. Walton. 31 May 57, 11p
Aeroballistic Research rept. 217; NAVORD rept. 3634
OTS $1.60

DESCRIPTORS: *Guided missiles, Mach number, Subsonic characteristics, Transonic characteristics, Supersonic characteristics, *Drag, Equations.

An analysis of previous formulae used for representing the drag on a missile as a function of the Mach number shows the desirability of developing a new formula. This is done with the result that a simple formula is now available for fitting drag data throughout the entire range of Mach number - - subsonic, transonic, and supersonic. An example is given. (Author)

METALLURGY

ANL-6665
Argonne National Lab., Ill.
IRRADIATION AND POSTIRRADIATION ANNEALING OF SOME ALUMINUM-BASE FUELS. Final rept.
C. F. Reinke. Sep 63, 39p
Contract W31-109-eng-38
OTS $1.00

ANL-FGF-402
Argonne National Lab., Ill.
THE OXIDATION OF ZIRCONIUM BINARY ALLOYS IN 700°C OXYGEN FOR TIMES UP TO 200 DAYS
R. D. Misch and C. Van Drunen. 30 Oct 62, 39p
Contract W31-109-eng-38
OTS $3.60

ANL-FGF-292
Argonne National Lab., Ill.
THE RATE OF SOLUTION OF SOME TRANSITION ELEMENTS IN LIQUID ALUMINUM
J. B. Darby, Jr., D. B. Jugle, and O. J. Kleppa.
2 Apr 62, 22p
Contract W31-109-eng-38
OTS $2.60

ANL-6651
Argonne National Lab., Ill.
SWELLING OF ALUMINUM-CLAD ALUMINUM-PLUTONIUM ALLOYS ON POSTIRRADIATION ANNEALING. Final rept.
B. A. Loomis. Nov 63, 10p
Contract W31-109-eng-38
OTS $0.50

N64-13012
Astronuclear Lab., Westinghouse Electric Corp., Pittsburgh, Pa.
DETERMINATION OF THE WELDABILITY AND ELEVATED TEMPERATURE STABILITY OF REFRACTORY METAL ALLOY. Quarterly rept. no. 1, 21 Jun-21 Sep 63
G. G. Lessmann and D. R. Stoner. [1963] 70p
Contract NAS3-2540
WANL-PR-(P)-001; NASA CR-52347
OTS $6.60

PB-165 031
Battelle Memorial Inst., Columbus, Ohio.
A STUDY ON POSSIBLE METHODS FOR IMPROVING FORGING AND EXTRUDING PROCESSES FOR FERROUS AND NONFERROUS MATERIALS. PART V. STUDY OF LUBRICANTS FOR HOT-EXTRUSION OPERATIONS. Final engineering summary rept., 10 Apr 56-10 Apr 57
H. L. Shaw, F. W. Boulger, and C. H. Lorig. 10 Jun 57, 85p
Contract AF33(600)26272
AD-145 341
OTS $8.10

DESCRIPTORS: *Titanium, *Steel, *Aluminum alloys, *Magnesium, *Extrusion, *Lubricants, *Halocarbon plastics, Fluorocarbons

Topics include: Study of lubricants for hot extrusion of unalloyed titanium; of A4340 steel; and of 2014 aluminum alloy; notes on use of tetrafluoroethylene resin primer as a lubricant for extruding magnesium; effects of billet pretreatment on heating rate. (See also PB 140 915)

AD-402 316 repriced
Baylor Univ., Waco, Tex.
THE EFFECT OF ADDITIVES ON ELECTRODEPOSITION AND ELECTRODISSOLUTION OF METALS. Final rept. on Characterization of Solid Phase and Interphase Phenomena in Crystalline Substances
Thomas C. Franklin, Jerry Barrett, Robert E. Graves, Fred Tibbals, and John Bowman. Mar 63, 49p
Contract AF33(657)7485
ASD-TDR-63-212; N63-14893
OTS $4.60

DESCRIPTORS: *Electroplating, *Additives, *Electroplating solutions, Electrolytes, Electrodeposition, Cyanides, Sulfates, Anodes, *Nickel, Electrolytic polishing, Sulfur compounds, *Cadmium.

A preliminary investigation was made of the effect of additives on the electrodeposition of cadmium and on the electrodissolution of nickel. The electrodeposition study was primarily limited to a study of techniques. These techniques included constant current pulses, cyclic voltammetry, microvolumetric measurement of hydrogen evolved, and hydrogen embrittlement. It was found that the current efficiency for the deposition of cadmium varied with concentration of additive in a regular pattern. Using different plating times, different base metals, different current densities, and in stirred and unstirred solutions the additive effects on current efficiency were similar. The electrodissolution study indicated that under some conditions an oxidizing additive acted on the metal in a first order corrosion reaction. This reaction was accelerated by the application of the anodic potential. (Author)

PB-165 085
Chemical and Metallurgical Research, Inc., Chattanooga, Tenn.
MOLECULAR FORMING TECHNIQUES. Final rept., 5 Feb-15 Sep 62, on Technical Evaluation of Molecular Forming Techniques
Julian Glasser and William E. Few. Dec 62, 68p
Contract AF33(616)6288
ASD-TDR-62-999
OTS $6.60

DESCRIPTORS: *Material forming, *Electroforming, *Vapor plating.

This molecular forming study suggests that certain facets of R & D should be accelerated, since the technique does offer some advantages over conventional metal forming techniques. As used in this report, "molecular forming" is defined as the production of fabricated or semi-fabricated shapes directly from molecular species or compounds, wherein chemical or electrochemical reactions take place to form the shape and to define properties. The initial compounds may be in either condensed or gaseous states, and the subsequent reactions may be either liquid phase or gas phase reactions on a solid state surface. By molecular forming techniques, shapes can be finalized with little or no additional fabrication or machining. (Author)

DRI-2094
Denver Research Inst., Colo.
THE KINETICS OF TRANSFORMATION OF NIOBIUM-BASE, ZIRCONIUM ALLOYS. Final rept.
Charles E. Lundin and Ronald H. Cox. 27 Mar 63, 72p
Contract AT(11-1)752
OTS $7.60

RFP-331
Dow Chemical Co., Golden, Colo.
QUANTITATIVE METALLOGRAPHY OF PLUTONIUM USING POINT-COUNT TECHNIQUES
R. L. Greeson. 2 Jan 64, 14p
Contract AT(29-1)1106
OTS $0.50

NASA-CR-22
Field Emission Corp., McMinnville, Oreg.
FIELD-EMISSION INVESTIGATION OF THERMAL DESORPTION AND SURFACE DIFFUSION OF CESIUM ON TUNGSTEN
L. W. Swanson, R. W. Strayer, F. M. Charbonnier, and E. C. Cooper. Jan 64, 42p
Contract NASw-458
N64-12912
OTS $1.25

AD-404 025
General Dynamics/Astronautics, San Diego, Calif.
PHYSICAL AND MECHANICAL PROPERTIES OF PRESSURE VESSEL MATERIALS FOR APPLICATION IN A CRYOGENIC ENVIRONMENT, PART II. Final rept., Jun 62-Feb 63, on Materials Application
J. L. Christian and A. Hurlich. Apr 63, 176p
Contract AF33(616)7719
Rept. AE63-0090; ASD-TDR-62-258, Part II
OTS $12.50

DESCRIPTORS: *Stainless steel, *Aluminum alloys, *Titanium alloys, Sheets, *Welded joints, Physical properties, Mechanical properties, Tensile properties, *Pressure vessels, *Cryogenics,

Physical and mechanical properties of several high strength stainless steel, aluminum, and titanium sheet alloys were determined from 78° to -423°F. Tests included tensile; notched tensile; fusion welded tensile; spot-welded tensile and shear; high-stress, low cycle axial fatigue of complex welded joints; and static and fatigue crack propagation tests of center notched specimens. The data were statistically analyzed and are presented in tabular and graphic form. Descriptions of test equipment, experimental procedure, test specimens, and chemical analyses of alloys are given. (Author) (See also AD-284 293)

HW-72031
Hanford Atomic Products Operation, Richland, Wash.
HIGH TEMPERATURE, SHORT-TIME, URANIUM CARBIDE-METAL REACTIONS
J. A. Christensen. Mar 63, 18p
Contract AT(45-1)1350
OTS $0.50

HW-78962
Hanford Atomic Products Operation, Richland, Wash.
METALLURGY RESEARCH OPERATION. Quarterly progress rept. Jul-Sep 63, 15 Oct 63, 253p
Contract AT(45-1)1350
OTS $3.50

AD-419 028 repriced
Institute of Engineering Research, Univ. of California, Berkeley.
THERMAL RADIATION PROPERTIES OF MATERIALS. PART III. Final rept.
R. A. Seban. Aug 63, 72p
Contract AF33(657)7793; continuation of Contract AF33(616)6630
WADD-TR-60-370, Part III; N63-22597
OTS $2.00

DESCRIPTORS: *Heat-resistant metals and alloys, Emissivity, Spectroscopy, Thermal radiation, *Platinum, *Nickel, *Copper, *Molybdenum, *Iron, *Ceramic coatings, Oxides, Chromates, Titanium compounds, *Nickel alloys, *Chromium alloys, Iron alloys, *Stainless steel.

The effect of temperature on the normal spectral emittance in the range from 1 to 15 microns is demonstrated for certain polished metals and some oxidized and coated metals by a comparison of absorptances measured at room temperature and emittances measured at temperatures of the order of 2000°R to 2500°R. The results for platinum, nickel, and iron reveal at high temperature the correspondence with the Hagen-Rubens law which is implied by available results on the total normal emittance, though the correspondence in this spectral range must be attributed to anomalous effects. With oxides and with coated materials the effect of temperature on the spectral values appears to be small and localized, though with some materials these are indications of permanent changes in the emittance as the period of exposure to high temperature is increased. (Author) (See also AD-286 863)

NASA-TN-D-2045
Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
RESIDUAL STATIC STRENGTH OF SEVERAL TITANIUM AND STAINLESS-STEEL ALLOYS AND ONE SUPERALLOY AT -109° F, 70° F, AND 550° F
I. E. Figge, Dec 63, 23p
N64-12104
OTS $0.75

LA-2981
Los Alamos Scientific Lab., N. Mex.
OPERATING INSTRUCTIONS, PROCEDURES, AND EQUIPMENT FOR THE LOS ALAMOS PLUTONIUM ELECTROREFINING PLANT
L. J. Mullins, J. A. Leary, and A. N. Morgan.
9 Sep 63, 34p
Contract W7405-eng-36
OTS $0.75

AD-295 519
McDonnell Aircraft Corp., St. Louis, Mo.
INVESTIGATION OF HYDROGEN EMBRITTLEMENT OF HARD HIGH CHROMIUM ALLOY PLATED 4340 STEEL. Final rept.
J. Krieg. 10 Jan 63, 22p
Contracts AF33(657)7749 and BPSN2(8-7381)73812
Rept. no. 9331
OTS $2.60

DESCRIPTORS: *Steel, *Hydrogen embrittlement, Tensile properties, Fatigue (Mechanics), *Chromium plating, Chromium alloys.

The purpose of the investigation was to determine the effects of a hard high chromium alloy plating process as applied to 4340 steel, heat treated to the 220-240 ksi range and to certify three vendors capable of employing this process. Notched tensile specimens were machined from 4340 steel heat treated to the 220-240 range. These specimens were divided into groups of ten and sent to three different vendors to be hard high chromium alloy plated. The NTS of the material was determined from five, unplated control notched tensile specimens. The plated specimens from each vendor were divided into two groups; one group was tested in sustained load in the as-received condition, while the other group was given an embrittlement relieving operation at 375F for 24 hours before testing in sustained load. The sustained load specimens were first loaded to 75% NTS for a period not exceeding 100 hours. Specimens which withstood 100 hours at 75% NTS were loaded to 90% NTS for a period not exceeding 100 hours. None of the sustained load specimens which were tested in the as-received condition, withstood more than five hours at 75% NTS. All of the sustained load specimens which were given the embrittlement relieving operation before testing, withstood 100 hours at 75% NTS and at 90% NTS. (Author)

AD-285 887
McDonnell Aircraft Corp., St. Louis, Mo.
MIG WELDING OF ALUMINUM - MAGNESIUM ALLOY 5456. Final rept.
R. H. Brookes, 10 Oct 62, 24p
Contract AF33(657)7749
Rept. no. 9067
OTS $2.60

DESCRIPTORS: *Arc welding, *Aluminum alloys, *Magnesium alloys, Welding, Mechanical properties.

This test was conducted to gain experience with the Linde "Sigmatic" manual MIG welding equipment for welding high strength aluminum - magnesium alloy 5456-H343. Tests were conducted on aluminum - magnesium alloy 5456-H343 sheet material. Both butt and tee joints were made from material thickness between .051 and .200 inches. The welded material had a tensile strength of approximately 47,000 psi and a yield strength varying between 23,000 and 31,000 psi as compared to the unwelded material properties of 60,ppp psi Fty and 45,000 psi Fty, which indicates that the process should be considered for use on a production basis. (Author)

PB-165 059
New York Univ., N. Y.
A SURVEY OF DISPERSION STRENGTHENING OF METAL ALLOYS. Rept. for 15 Jun 58-15 Jul 59, on Ceramic and Cermet Materials
R. F. Bunshah and C. G. Goetzel. Mar 60, 258p
Contract AF33(616)5882
WADC Technical rept. 59-414; AD-237 146
OTS $16.50

DESCRIPTORS: *Dispersion hardening, *Alloys, Theory, Phase studies, Mechanical properties, Bibliographies,

This report includes a survey of the literature as well as an account of the current work. A review of the theories advanced to explain dispersion strengthening is presented. The structural and other variables which govern the strength and stability of these alloys are outlined and the results discussed in terms of these variables. Comparison of theories with experimental results have been made. The results of the survey indicate that dispersion strengthened alloys exhibit outstanding properties at elevated temperatures when the right structural conditions are present i.e. the interparticle spacing is in the range 0.01-0.1 micron, with high hardness of the dispersed phase, low interfacial energy between matrix and dispersed phase (in most cases). Other contributing factors are stored energy, coherency strains and matrix strengthening by solid solution. A large number of techniques can be used to produce dispersions in metals and alloys. The report contains a summary of these techniques. (Author)

TID-16820
Stanford Research Inst., Menlo Park, Calif.
HIGH TEMPERATURE OXIDATION AND NITRIDATION OF NIOBIUM IN ULTRAHIGH VACUUM.
Quarterly rept. no. 1, 1 Jun-31 Aug 62. 13 Sep 62, 17p
Contract AT(04-3)115
SRI Proj. no.
PAU-4151
OTS $1.60

PB-165 016
Westinghouse Research Labs., Pittsburgh, Pa.
DEVELOPMENT OF A NICKEL-BASE MATERIAL DISPERSION-HARDENED BY ALUMINA FOR 1600°F TO 2000°F SERVICE. Progress rept. no. 6, 7 Nov 59-6 Jan 60
D. H. Feisel. 14 Apr 60, 15p
Contract NOas-59-6051-c
AD-239 291
OTS $1.60

DESCRIPTORS: *Nickel alloys, Aluminum compounds, Oxides, Iron alloys, Aluminum alloys, Pressure, Tensile properties, Temperature, Extrusion, Rupture, Hardness, Failure (Mechanics), Microstructure, *Alloys, Heat-resistant metals and alloys,

Studies were made of the compositions of 5 experimental alloys and of their compressive and stress-rupture strengths. Examination of photomicrographs of the alloys in the as-polished condition indicated that the analyzed alumina contents may be 3 times that reported by wet chemical methods; analysis will be carried out by methods to avoid loss of the alumina. Specimens 1/4 in. in diameter by 1/2 in. in length were machined from the as-extruded alloys. They were tested in air at a strain rate of 360% per hr from room temperature to 1800°F. Alloy DH6 (82.8 wt-% Ni, 10.1 wt-% Fe, 7.14 wt-% Al) had the best compressive qualities (21.7 to 52.0% total deformation between room temperature and 1800°F). DH6 was followed closely by DH3 (82.7 wt-% Ni, 11.1 wt-% Fe and 6.16 wt-% Al) with 8.2 to 50.4% total deformation between rc m temperature and 1800°F. Above 1100°F the compressive strength values for these 2 alloys dropped markedly. For comparable material and test temperature, compressive yield properties are superior to tensile yield properties, an explanation being that the onset of cracking is not a factor in compressive tests. (DDC Abstract)

Light Metals

AD-291 160
Battelle Memorial Inst., Columbus, Ohio.
TANTALUM-ALLOY-PROCESSING DEVELOPMENT.
Interim progress rept. no. 2, 1 Sep-30 Nov 62
D. J. Maykuth and H. R. Ogden. 30 Nov 62, 25p
Contract AF33(657)8911
ASRCT TR-7-781(II)
OTS $2.60

DESCRIPTORS: *Titanium alloys, *Tungsten alloys, *Molybdenum alloys, Processing, Material forming, *Extrusion, *Forging, Recrystallization, *Sheets, Production,

Analyses on double-melted, 4-1/4-inch-diameter ingots of the Ta-5W-2.5Mo and Ta-10W-2.5Mo alloys showed that the actual metallic alloy content was close to that intended. Also, interstitial impurities were held to a total of less than 200 ppm. Two billets of each alloy were successfully extruded through 4:1 reductions at 2600 F to 1.2 by 2.6-inch sheet bars. Subsequently, samples of both alloys were successfully forged from a 1.2 to 1/2-inch thickness at 2200 F, using two reheats. A recrystallization treatment prior to forging the extruded bars is favored to keep material yield at a high level. (Author)

AD-277 602
Beryllium Corp., Reading, Pa.
BERYLLIUM CASTING. Final technical documentary rept., 19 Sep 59-15 Jan 62
J. P. Denny and B. H. Hessler. Mar 62, 81p
Contract AF33(600)37902
ASD-TDR-62-390
OTS $8.10

DESCRIPTORS: *Beryllium, *Casting, *Molding, Cooling, Deformation, *Grain structures (Metallurgy), Mechanical properties, Material forming,

A manufacturing process was developed for the production of sound three inch diameter vacuum cast beryllium billets suitable for fabrication. The casting technique relies on a thermal gradient within the mold (hot top, cold bottom) to control directional solidification of the metal and eliminate the center-line shrinkage and cracking encountered in conventionally cast billets. Ingots produced by this process were successfully converted on a laboratory scale into rolled sheet, extruded rod and tubing, and forged cup. (Author) (See also AD-266 741)

PB-165 015

Brush Beryllium Co., Cleveland, Ohio.
FABRICATION OF BERYLLIUM WIRE. Progress rept. no. 4, 16 Apr-1 Jul 59
A. G. Gross, Jr., R. G. O'Rourke, and W. W. Beaver. [1959] 60p
Contract NOas-59-60-30-c
Technical rept. no. 155; AD-22 967
OTS $5.60

DESCRIPTORS: *Beryllium, *Wire, Material forming, *Drawing (Machine processing), Dies, Lubricants, X-ray diffraction analysis, Annealing, Powder metals.

Operational drawing parameters have been firmly established for 12 1/2-degree tungsten carbide dies, using molybdenum disulfide with an epoxy resin binder for lubrication. Beryllium wire of 0.063-inch diameter has been drawn successfully with this technique. X-ray diffraction studies indicate that perfect texture will not result from any real values of drawing reduction regardless of annealing practice. These studies also indicate that the operative slip systems are basal and the average fiber axis is [210]. Annealing practices have been investigated, and two feasible cycles have been found. A temperature of 1290°F for 60 minutes with an air cool may be used for a reasonably efficient stress relief without recrystallization. A temperature of 1480°F for 30 minutes with heat shield followed by air cooling may be used to completely stress relieve with recrystallization. Heating rate appears to be a critical parameter in this practice. The 1480°F temperature is preferred from the standpoint of uniformity of annealed tensile properties. The production of draw stock by swaging powder, sintering, and warm swaging the sintered rod has been probed. The results are promising and indicate that further refinements in the powder-swaging technique are in order (Author) See also PB-152 197)

PB-165 028
[IIT Research Inst.] Chicago, Ill.
DUCTILE BERYLLIUM ALLOYS Final rept., 1 Sep 59-31 Aug 60
Frank A. Crossley and Ray J. Van Thyne. 20 Oct 60, 47p
Contract NOas-60-6036-c
AKF 2187-6; AD-247 420
OTS $4.60

DESCRIPTORS: *Beryllium alloys, Aluminum alloys, Silver alloys, Phase studies, Microstructure, Sintering, Hardness, Mechanical properties, Germanium alloys, *Powder metallugy, Fracture (Mechanics)

An envelope-type microstructure prepared by liquid-phase sintering was investigated as a means of producing ductile beryllium alloys. Ternary additions of calcium, cerium, germanium, lanthanum, lithium and yttrium were made to aluminum and silver matrix alloys to evaluate their effect in promoting sinterability. Germanium was effective in producing desirable two-phase structures. Macroporosity was elimated in compacts containing 15% or less volume of matrix by sintering under a pressure of 1000 psi. Alloying beyond the ternary level was necessary in order to reduce the hardness differential between the beryllium phase and the much softer matrices. When such a hardness difference exists, fracture of the matrix occurs before significant flow of the principal phase, with the result that ductility is poor. Aluminum additions to silver matrix alloys were effective in increasing the matrix hardness. A cylindrical compact of nominal matrix composition Ag-6Al-3Ge was tested in uniaxial compression. Properties were as follows: yield stress (0.2% offset)—52,400 psi, true fracture stress—97,000 psi, engineering fracture stress—130,000 psi, total plastic deformation—22%, modulus of elasticity—22,000,000 psi, and density—2.07 g/cc. The matrix content of this material was calculated from the density to be about 3% by volume. Its modulus-to-density ratio is 2.9 times that of steel. (Author) (See also PB-160 492)

PB-165 017
[Reactive Metals, Inc., Niles, Ohio].
THE MANUFACTURE OF HEAT TREATABLE Ti-6Al-4V, Ti-2.5Al-16V AND Ti-8Al-8Zr-1 (Cb+Ta) TITANIUM SHEET. Bi-monthly progress rept. no. 21, 25 Nov 59-25 Jan 60
P. E. Moorhead, W. B. Aufderhaar, and S. R. Seagle.
Feb 60, 19p
Contract NOas-56-994-c
AD-234 895
OTS $1.60

DESCRIPTORS: *Titanium alloys, *Aluminum alloys, *Vanadium alloys, *Sheets, Production, Arc welds, Welding, Heat treatment, Tensile properties, Fillers

Ti-2.5Al-16V: The work on this alloy is complete. Ti-6Al-4V: Sheets, 0.063- and 0.125-in. thick, were rolled and cleaned preparatory to solution treatment. The mechanical properties of representative samples and of these sheets in the laboratory-annealed, solution-treated, and age-hardened conditions were tabulated. Ti-8Al-8Zr-1(Nb-Ta): Three 4500-lb ingots were melted and forged to 4- x 16-in. slabs. Data on the weldability of this alloy by spot and arc welding on 0.040-in. production rolled sheet were tabulated. Manual and mechanized inert gas-shielded arc and spot welding were evaluated for tensile ductility, and bend ductility with 3 different filler materials (MST30, Ti-8Al-2Nb-1Ta, and MST 881). The spot welds were evaluated for tension-shear strength and cross-tension strength. The bend ductility of the specimens was not reduced after arc welding with any of the filler materials, in some instances the welded joints were more ductile than the base metal. The tensile properties of joints made with MST 881 and MST 821 filler metals were about the same or exceeded the strength of the base metal, while those with MST 30 filler metal were lower in strength than the base metal. The tensile elongations of the welds were less than 1/2 that of the base metal, but were considered satisfactory. Porosity was encountered in all the arc welded joints. (DDC abstract)

PB-165 029
Sylvania Electric Products, Inc. [Towanda, Pa.]
FABRICATION OF BERYLLIUM FINE WIRE.
Progress rept. no. 2, 1 Jun-1 Aug 60
A. G. Gross, R. G. O'Rourke, and W. W. Beaver.
[1960] 14p
Contract NOas 60-6108-c
AD-243 448
OTS $1.60

DESCRIPTORS: *Beryllium, *Wire, Material forming, Drawing (Machine processing), Mechanical properties, Finishes and finishing, Hydrogen compounds, Fluorides, Nitric acid.

Efforts are being made to develop techniques for drawing QMV beryllium wire at sizes smaller than 0.030-in. diameter and to furnish a minimum of 10 ft of the smallest diameter produced. An investigation was made of surface preparation techniques, since generally the surface condition of the wire becomes more important as the wire diameter decreases. A suitable chemical solution was found for effectively dissolving Be while improving the plastic flow properties of the wire surface by trying various concentrations of HF and HNO_3 in H_2O at various operating temperatures. The preferred solution contained 0.3 wt-% HF and 15.4 wt-% HNO_3 which performed better at 70°C than at room temperature. This solution when used at 76° 5°C produced a very uniform attack at a rate of about 0.0005 in. of surface removal per minute. Warm HF-HNO_3 improved the surface plastic flow properties of the Be wire by a significant amount, and the appearance of the wire was greatly enchanced with neither selective etching nor ellipticity being introduced. (DDC abstract)

Nonferrous (except light) Metals

PB-165 081
Fansteel Metallurgical Corp., North Chicago, Ill.
COLUMBIUM ALLOY SHEET ROLLING PROGRAM.
Interim rept. no. 1, 7 Mar-6 May 63. 7 May 63, 4p
Contract NOw 63-0231-c
N63-16545
OTS $1.10

DESCRIPTORS: *Niobium alloys, Tantalum alloys, Tungsten alloys, Molybdenum alloys, Zirconium alloys, *Sheets, Material forming,

A program has been initiated for the preparation and evaluation of preproduction quantities of sheet from two "second generation" columbium-base alloys; FS-85 (Cb-27Ta-10W-1Zr) and B-66 (Cb-5V-5Mo-1Zr).

AD-403 368
General Electric Co., Cincinnati, Ohio.
MATERIALS PROPERTY DATA COMPILATION. PART I. HASTELLOY X. Quarterly rept. no. 5, on Materials Information Data Compilation
R. J. Favor and H. G. Popp. 1 May 63, 184p
Contract AF33(657)8017
OTS $13.00

DESCRIPTORS: Alloys, Mechanical properties, Aircraft materials, Sheets, Jet engines, Fatigue (Mechanics), *Chromium alloys, *Iron alloys, *Nickel alloys, Cobalt alloys, Molybdenum alloys.

Compilation of reports containing mechanical properties of Hastelloy X are included. Mechanical properties reported are tensile, rupture, creep, fatigue and miscellaneous other properties.

AD-403 328
General Electric Co., Cincinnati, Ohio.
MATERIALS PROPERTY DATA COMPILATION. PART II. UDIMET 700. Quarterly rept. no. 5, on Materials Information Data Compilation
R. J. Favor and H. G. Popp. [1963] 113p
Contract AF33(657)8017
OTS $9.60

DESCRIPTORS: Alloys, *Cobalt alloys, *Nickel alloys, *Chromium alloys, Aluminum alloys, Titanium alloys, Molybdenum alloys, Mechanical properties, Turbine blades, Jet engines, Tensile properties.

Compilation of reports containing mechanical properties on Udimet 700 are included. Mechanical properties reported are tensile, rupture, creep, fatigue and miscellaneous other properties. (See also AD-403 368)

PB-165 020
Rensselaer Polytechnic Inst., Troy, N. Y.
COLUMBIUM-BASE MATERIALS. Final rept., 19 May 57-31 Aug 59
F. V. Lenel and L. J. Regitz. [1959[71p
Contracts NOas-57-739-d and NOas-59-6047-c
AD-239 276
OTS $7.60

DESCRIPTORS: *Heat-resistance metals and alloys, *Niobium, *Dispersion hardening, *Powder metallurgy, Sintering, Extrusion.

A technique was developed wherein relatively coarse particles of metallic columbium were hydrided and ballmilled to a very fine particle size. This powder was compacted, and the resulting compact dehydrided, and then sintered to a high density by the simultaneous application of pressure and high electical current. The dense compact may serve as a billet for hot working by extrusion. Suitable apparatus was developed for hydriding, ballmilling, compacting, dehydriding, and resistance sintering columbium in such a way that impurity pickup, particularly the pickup of interstitial impurities such as oxygen and nitrogen, was minimized during processing. Attempts were made to develop a technique for extruding small columbium billets by heating them by electrical resistance and simultaneously extruding them through a steel die with a tungsten insert. Some of the considerations in the choice of a material for a second phase are discussed. (Author) (See also PB 159 106)

TID-15942
Johns Hopkins Univ., Baltimore, Md.
KINETICS OF FAST INTERFACIAL REACTIONS WITH PARTICULAR REFERENCE TO A TECHNIQUE FOR STUDY OF METAL CORROSION
Chatten Cowherd, Jr. and H. E. Hoelscher. Apr 62, 37p
Contract AT(30-1)2334
OTS $3.60

AD-294 450
Metals and Ceramics Lab., Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
DISLOCATION PINNING EFFECTS IN UNALLOYED MOLYBDENUM. Final rept., Dec 60-Jul 61, on Metallic Materials
C. S. Hartley and R. J. Wilson. Nov 62, 34p
ASD-TDR-62-859
OTS $3.60

DESCRIPTORS: *Molybdenum, *Crystal lattice defects, *Grain structures (Metallurgy), Impurities, Nitrogen, Oxygen, Carbon, Diffusion,

The rate of yield point return and modulus defect recovery is studied in powder metallurgical and arc-cast molybdenum, respectively. The activation energy for yield point return is found to be 25,100 ± 2700 cal/mol, and is believed to be due to pinning of deformation produced free dislocations by interstitial oxygen or nitrogen atoms. A calculation of the number of impurity atoms per unit length of dislocation line necessary to cause yield point return suggests that this pinning is effected by the formation of microprecipitates. Possible mechanisms consistent with this idea which exhibit kinetics similar to the Cottrell-Bilby "atmosphere" theory are discussed. Recovery of the modulus defect is shown to be controlled by the diffusion of the slowest pinning defect. The activation energy for diffusion of the slowest defect calculated from a treatment based on the Granato-Hikata-Lucke theory of point defect pinning is 44,300 ± 8000 cal/mol. It is suggested that this defect is carbon. (Author)

NMI-1911
Nuclear Metals, Inc., Concord, Mass.
BERYLLIUM CORROSION. Final rept. 25 Apr 62-24 Apr 63.
D. S. Kneppel. 24 Mar 63, 93p
Contract AT(30-1)3012
OTS $2.00

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

IS-575
Ames Lab., Iowa State Univ. of Science and Tech.
NEW DESIGN OF A COMPLETELY AUTOMATED HIGH PRECISION CURVED-CRYSTAL SPECTROMETER
H. Toffer and E. N. Hatch. Nov 62, 52p
Contract W7405-eng-82
OTS $1.50

IS-590
Ames Lab., Iowa State Univ. of Science and Tech.
PRECISE MEASUREMENT OF THE K-SHELL INTERNAL CONVERSION COEFFICIENT OF THE 344-KEV, E2 TRANSITION IN Gd^{152}
Guy Schupp and E. N. Hatch. Aug 62, 95p
Contract W7405-eng-82
OTS $2.25

IS-558
Ames Lab., Iowa State Univ. of Science and Tech.
RADIOCHEMICAL STUDIES OF SOME PILE-NEUTRON FISSION YIELDS OF THORIUM-232
James Matthew Crook and A. F. Voigt. Nov 62, 91p
Contract W7405-eng-82
OTS $2.00

WAPD-T-1458
Bettis Atomic Power Lab., Pittsburgh, Pa.
APPLICATION OF THE SPHERICAL HARMONICS TECHNIQUE TO PROBLEMS IN GAMMA TRANSPORT
W. D. Lanning. Jun 62, 34p
Contract AT(11-1)GEN-14
OTS $3.60

BNL-6052
Brookhaven National Lab., Upton, N. Y.
EXTINCTION AND DIFFUSE NEUTRON INTENSITY MEASUREMENTS
D. T. Keating and C. B. Walker (Institute for the Study of Metals, Univ. of Chicago) 19 Jun 62, 11p
Contract AT(30-2)GEN-16
OTS $1.60

BNL-6079
Brookhaven National Lab., Upton, N. Y.
FISSION FRAGMENT ENERGY DEPOSITION EFFICIENCY
Meyer Steinberg. Mar 62, 16p
Contract AT(30-2)GEN-16
OTS $1.60

BNL-6535
Brookhaven National Lab., Upton, N. Y.
INFLUENCE OF LOW CONCENTRATIONS OF CRYSTAL DEFECTS ON THERMAL ANNEALING OF RECOIL Br^{82} IN HEXABROMOETHANE
Kenneth E. Collins and Garman Harbottle. 20 Dec 62, 19p
Contract [AT(30-2)GEN-16]
OTS $1.60

BNL-6097
Brookhaven National Lab., Upton, N. Y.
IRRADIATION INDUCED EFFECTS IN MAGNESIUM OXIDE CATALYSTS
J. Hoigne and D. Ballantine. 19 Jun 62, 21p
Contract AT(30-2)GEN-16
OTS $2.60

BNL-6159
Brookhaven National Lab., Upton, N. Y.
ISOTOPE EFFECTS ON INTERMOLECULAR INTERACTIONS AND ISOTOPIC VAPOR PRESSURE DIFFERENCES
Max Wolfsberg. 19 Jun 62, 23p
Contract AT(30-2)GEN-16
OTS $2.60

BNL-6083
Brookhaven National Lab., Upton, N. Y.
RADIATION DAMAGE IN GRAPHITE. I. THE ACTIVATION ENERGY FOR ANNEALING SINGLE INTERSTITIALS IN NEUTRON IRRADIATED GRAPHITE AND THE ABSOLUTE RATE OF FORMATION OF DISPLACED ATOMS
Donald G. Schweitzer. 19 Jan 62, 22p
Contract AT(30-2)GEN-16
OTS $2.60

BNL-6055
Brookhaven National Lab., Upton, N. Y.
THE TEMPERATURE DEPENDENCE OF BIREFRINGENCE IN IRRADIATED POLYETHYLENE
B. Keneally, J. Gard, and G. Adler. 19 Jun 62, 12p
Contract AT(30-2)GEN-16
OTS $1.60

BNL-6032
Brookhaven National Lab., Upton, N. Y.
THE THERMAL DECOMPOSITION OF IRRADIATED α LEAD AZIDE
Joseph Jach. 18 Jan 62, 36p
Prepared in cooperation with Picatinny Arsenal.
Contract AT(30-2)GEN-16
OTS $3.60

NP-12512
Georgia Inst. of Technology, Atlanta.
GEORGIA TECH RESEARCH REACTOR. Final safeguards rept. Jan 63, 170p Prepared in cooperation with General Nuclear Engineering Corp.
OTS $12.00

SRO-56
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
FISSION PRODUCT SEPARATION BY SOLVENT EXTRACTION. Final rept. 1 Apr 59-31 Dec 62.
Robert J. Klett. 1 Aug 63, 290p
Contract AT(38-1)202
OTS $3.50

HW-SA-1973
Hanford Atomic Products Operation, Richland, Wash.
ACTIVE METAL REDUCTION OF PLUTONIUM TRICHLORIDE
T. S. Soine and H. H. Hopkins, Jr. 6 May 60, 10p
Contract AT(45-1)1350
OTS $1.10

HW-SA-2432(Rev.)
Hanford Atomic Products Operation, Richland, Wash.
CRITICAL MASS EXPERIMENTS WITH PLUTONIUM NITRATE SOLUTIONS
E. D. Clayton, R. C. Lloyd, and W. A. Reardon.
23 May 62, 22p
Contract AT(45-1)1350
OTS $2.60

HW-79174
Hanford Atomic Products Operation, Richland, Wash.
PROGRESS IN TREATMENT OF A RADIOACTIVE CONDENSATE WASTE
J. M. Skarpelos. Oct 63, 73p
Contract AT(45-1)1350
OTS $2.00

HW-SA-2616
Hanford Atomic Products Operation, Richland, Wash.
X-RAY DIFFRACTION OF HIGHLY IRRADIATED FUEL ELEMENTS 28 May 62, 5p
Contract AT(45-1)1350
OTS $1.10

HASL-142
Health and Safety Lab., Atomic Energy Commission, New York.
FALLOUT PROGRAM. Quarterly summary rept. 1 Sep-1Dec 63.
Edward P. Hardy, Jr., Joseph Rivera, and William R. Collins, Jr. 1 Jan 64, 342p
OTS $4.00

JLI-2901-0-1
Johnston, William H. Labs., Inc., Baltimore, Md.
OZONE FORMATION IN THE RADIOLYSIS OF OXYGEN.
Special rept. 5 Aug 63, 60p
Contract AT(30-1)2901
OTS $1.50

UCRL-11047
Lawrence Radiation Lab., Univ., of California, Berkeley.
HYPERFINE STRUCTURES AND ANOMALY OF Li^6 AND Li^7, AND THE HYPERFINE STRUCTURES OF Re^{186} AND Re^{188}
Richard G. Schlecht. Thesis. 3 Oct 63, 83p
Contract W7405-eng-48
OTS $2.00

UCRL-11068
Lawrence Radiation Lab., Univ. of California, Berkeley.
K^* AND N^* PRODUCTION BY 1.96-BeV/c K^+ MESONS INTERACTING WITH HYDROGEN
Thomas Alphonsus O'Halloran, Jr. Thesis. 16 Oct 63, 56p
Contract W7405-eng-48
OTS $1.25

LA-2811(Addendum)
Los Alamos Scientific Lab., N. Mex.
OTHER DETAILS OF POST-FISSION BETA DECAY
James J. Griffin. 1 Oct 63, 31p
Contract W7405-eng-36
OTS $0.75

TID-16304
Massachusetts Inst. of Tech., Cambridge.
THE INVESTIGATION OF NEUTRON KINETICS AND CROSS SECTIONS IN FAST NON-MODERATING ASSEMBLIES BY THE NANOSECOND PULSED NEUTRON SOURCE TECHNIQUE
L. E. Beghian, N. C. Rasmussen, T. Thews, and J. Weber. 30 Jul 62, 24p
Contract [AT(30-1)2098]
OTS $2.60

ORNL-3407
Oak Ridge National Lab., Tenn.
EXPERIMENTAL DETERMINATION OF CORRECTIONS TO THE NEUTRON ACTIVATION OF GOLD FOILS EXPOSED IN WATER
W. Zobel. 4 Apr 63, 64p
Contract W7405-eng-26
OTS $6.60

IDO-16911
Phillips Petroleum Co., Idaho Falls.
ORGANIC COOLANT RESEARCH. Final summary rept. 1 Jul 60-31 Mar 63. 1 Oct 63, 72p
Contract AT(10-1)205
OTS $1.75

UVA-280-63U
Research Labs. for the Engineering Sciences, Univ. of Virginia, Charlottesville.
COUNTERCURRENT FLOW IN A SEMI-INFINITE GAS CENTRIFUGE: MIXED THERMAL BOUNDARY CONDITION
Herman M. Parker. Jan 63, 27p
EP-4422-280-63U
OTS $2.60

Instruments and Installations

BNL-6697
Brookhaven National Lab., Upton, N. Y.
MILKING SYSTEMS, STATUS OF THE ART
Margaret W. Greene, Robert F. Doering, and Manny Hillman. 15 Feb 62, 12p
Contract [AT(30-2)GEN-16]
OTS $2.60

N63-22172
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
POLARIZATION OF SYNCHROTRON RADIATION AND THE QUASI-TRANSVERSE PROPAGATION REGION
Leo J. Blumle. Jul 63, 8p
Technical memo X-50725; NASA X-615-63-126
OTS $1.10

HW-79186
Hanford Atomic Products Operation, Richland, Wash.
RADIOLOGICAL MONITOR FOR THE COLUMBIA RIVER
J. L. Stringer. Oct 63, 24p
Contract AT(45-1)1350
OTS $0.75

UCRL-6692
Lawrence Radiation Lab., Univ. of California, Livermore.
PLUTONIUM ALPHA AIR MONITOR USING A SOLID STATE DETECTOR
W. A. Phillips and C. L. Lindeken. 16 Apr 62, 14p
Contract W7405-eng-48
OTS $1.60

UCRL-6845
Lawrence Radiation Lab., Univ. of California, Livermore.
A STUDY OF COLLECTOR ANODES IN A GAS-FLOW G-M COUNTER
James F. Becker and Jon Bryan. 19 Mar 62, 18p
Contract W7405-eng-48
OTS $1.60

UCRL-6832
Lawrence Radiation Lab., Univ. of California, Livermore.
A SUMMATION COUNTER FOR THE DETECTION OF WEAK SIGNALS
L. W. Ducote and G. O. Brink. 29 Mar 62, 19p
Contract W7405-eng-48
OTS $1.60

TID-18578
Michigan Univ., Ann Arbor, Coll. of Literature, Science and the Arts.
THE UNIVERSITY OF MICHIGAN 83-INCH CYCLOTRON. Progress rept. no. 11, 1 Jan-31 Mar 63.
W. C. Parkinson and R. S. Tickle. Apr 63, 5p
Contract AT(11-1)921
03763-11p
OTS $1.10

PB-165 027
Microwave Lab., Stanford Univ., Calif.
EXTERNAL MAGNETIC FOCUSING DEVICES FOR THE MARK III ACCELERATOR. Technical rept. on Linear Electron Acceleration Project
J. A. McIntyre, R. L. Kyhl, and W. K. Panofsky. Jul 53, 51p
Contract N6-onr-25116
M. L. rept. no. 202; AD-13 750
OTS $5.60

DESCRIPTORS: *Linear accelerators, Particle accelerators, *Electron beams, Magnetic materials, Magnets, Focusing, Equations, Tests,

Solutions are presented of independent problems pertaining to the MK III accelerator. Included are the results of (1) preliminary studies on applying strong focusing, (2) calculations concerning a lens system to effect an achromatic translation of the beam, and (3) theoretical and experimental work on the halfway-station achromatic focusing system now used in the machine. (DDC Abstract)

IDO-16923
Phillips Petroleum Co., Idaho Falls.
ROUTINE TESTING AND CALIBRATION PROCEDURES FOR MULTICHANNEL PULSE ANALYZERS AND GAMMA-RAY SPECTROMETERS
D. F. Crouch and R. L. Heath. 1 Nov 63, 30p
Contract AT(10-1)205
OTS $0.75

RAI-202
Radiation Applications Inc., Long Island City, N. Y.
THE DEVELOPMENT OF LARGE BETA RADIATION SOURCES AND THEIR APPLICATIONS. Final rept.
Jacques J. Weinstock, Yael Miron, and P. Murali Krishna. Jul 63, 142p
Contract AT(30-1)2186
OTS $2.50

SC-4973(RR)
Sandia Corp., Albuquerque, N. Mex.
HEALTH PHYSICS ASPECTS OF OPERATION ROLLER COASTER
William D. Burnett, Harold L. Rarrick, and George E. Tucker, Jr. Jan 64, 37p
Contract AT(29-1)789
OTS $0.75

AD-289 567
Technical Operations, Inc., Burlington, Mass.
ATTENUATION OF POINT SOURCE GAMMA RADIATION IN SLABS. Final rept.
H. A. Mehlhorn, E. T. Clarke, R. Gold, and R. McMath. 5 Sep 62, 81p
Contract DA49-146-XZ-035
Rept. no. TO-B 62-13; DASA 1318
OTS $8.10

DESCRIPTORS: *Nuclear explosions, Air bursts, *Gamma rays, Attenuation, *Shielding, Metal plates, Structures, *Shelters, Dose rate.

Protection afforded by structures against γ rays due to a nuclear explosion in the atmosphere is investigated, both theoretically and experimentally. Calculations are made for the differential dose-rate spectrum (in air) due to fission products, and the differential dose spectrum due to thermal neutron capture in nitrogen, as a function of distance from the explosion and time, extending for several minutes after the explosion. The accumulated air dose due to nitrogen capture is shown to be far superior to that from fission products for several minutes at most distances. The superiority increases with distance and decreases with time. Some effects of nuclear weapon design on these conclusions are discussed. Progress is reported for an experimental program measuring the attenuation of rays in steel slabs, under conditions compatible with theoretical work being done at the National Bureau of Standards, using cobalt-60 as a source. (Author)

Y-1445
Union Carbide Nuclear Co., Oak Ridge, Tenn.
CENTERING CORRECTION FOR THE INSPECTION OF OFF-CENTER PARTS HAVING ROTATIONAL SYMMETRY
W. P. Amsbury and W. W. Lee. 10 Sep 63, 19p
Contract W7405-eng-26
OTS $0.50

TID-16251
Yale Univ., New Haven, Conn.
THIN FILMS FOR ACCURATE MEASUREMENT OF CHARGED-PARTICLE RANGES
T. L. Watts and C. J. Sneider. 18 Jul 62, 7p
Contract [AT(30-1)2726]
OTS $1.10

Nuclear Engineering and Power

ANL-6691
Argonne National Lab., Ill.
CRITICAL EXPERIMENT WITH BORAX-V. INTERNAL SUPERHEATER
K. E. Plumlee, O. L. Baird, G. S. Stanford, and P. I. Amundson. Nov 63, 36p
Contract W31-109-eng-38
OTS $0.75

ANL-FGF-329
Argonne National Lab., Ill.
EVALUATION AND ASSEMBLY BY VACUUM BRAZING OF THE SUPERHEATER FUEL PLATES FOR THE BOILING REACTOR EXPERIMENT-V
W. C. Kramer and C. H. Bean. 23 Feb 61, 5p
Contract W31-109-eng-38
UAC-6168
OTS $1.10

ANL-6103
Argonne National Lab., Ill.
EXAMINATION OF IRRADIATED RaLa SOURCE FUEL ROD (PROTOTYPE NO. 2) FOR LOS ALAMOS SCIENTIFIC LABORATORY. Final rept.
S. H. Paine, W. F. Murphy, and F. L. Brown. Oct 63, 22p
Contract W31-109-eng-38
OTS $0.50

ANL-6632
Argonne National Lab., Ill.
NONDESTRUCTIVE TESTS OF COMPONENTS OF EBR-I, CORE IV
R. H. Selner, C. J. Renken, R. B. Perry, and K. Balaramamoorthy (Atomic Energy Establishment)
Oct 63, 31p
Contract W31-109-eng-38
OTS $0.75

ANL-6721
Argonne National Lab., Ill.
A PERFORMANCE ANALYSIS OF THE EBWR AT VARIOUS POWER LEVELS
Alfred A. Nentwich. Oct 63, 40p
Contract W31-109-eng-38
OTS $1.00

ANL-6808
Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM. Progress rept. for Nov 63. 15 Dec 63, 86p
Contract W31-109-eng-38
OTS $2.00

ANL-6810
Argonne National Lab., Ill.
REACTOR DEVELOPMENT PROGRAM. Progress rept. for Dec 63. 15 Jan 64, 66p
Contract W31-109-eng-38
OTS $1.50

NAA-SR-6262
Atomics International, Canoga Park, Calif.
IRRADIATION OF U-Mo BASE ALLOYS
M. P. Johnson and W. A. Holland. 30 Jan 64, 34p
Contract AT(11-1)GEN-8
OTS $0.50

BAW-1257
Babcock and Wilcox Co., Lynchburg, Va.
ANALYSIS OF WATER MODERATED UO_2 AND ThO_2 LATTICES
David B. Wehmeyer. May 62, 49p
Contract AT(30-1)2602
OTS $4.60

BMI-1651
Battelle Memorial Inst., Columbus, Ohio.
POSTIRRADIATION RELEASE OF Xe^{133} FROM OXIDE CERAMICS
David L. Morrison, Thomas S. Elleman, and Duane N. Suderman. 17 Oct 63, 14p
Contract W7405-eng-92
OTS $0.50

BMI-1658
Battelle Memorial Inst., Columbus, Ohio.
PRODUCTION URANIUM RESIDUAL STRESSES, INTERNAL FRICTION, AND MODULUS
Ellis L. Foster, ed. 27 Dec 63, 39p
Contract W7405-eng-92
OTS $1.00

BMI-1655(Del.)
Battelle Memorial Inst., Columbus, Ohio.
PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING OCTOBER, 1963
Russell W. Dayton and Ronald F. Dickerson. 1 Nov 63, 77p
Contract W7405-eng-92
OTS $2.00

WAPD-T-1455
Bettis Atomic Power Lab., Pittsburgh, Pa.
EFFECTS OF HIGH BURNUP ON OXIDE CERAMIC FUELS
M. L. Bleiberg, R. M. Berman, and B. Lustman. Mar 62, 142p
Contract AT(11-1)GEN-14
OTS $11.00

BNL-6160
Brookhaven National Lab., Upton, N. Y.
FACILITY AVAILABILITY, BROOKHAVEN GRAPHITE RESEARCH REACTOR, JANUARY 1951-MARCH 1952
Dudley Thompson. 19 Jun 62, 10p
Contract AT(30-2)GEN-16
OTS $1.10

CEND-157
Combustion Engineering, Inc., Windsor, Conn.
THE DEVELOPMENT AND TESTING OF UO_2 FUEL SYSTEMS FOR WATER REACTOR APPLICATIONS. Summary rept. 1 Jul 61-15 Jun 62.
B. E. Murtha and W. P. Chernock. Jun 62, 156p
Contract AT(30-1)2863
OTS $2.75

TID-15437
Dynatech Corp., Cambridge, Mass.
THE TRANSITION FROM SLUG TO HOMOGENEOUS TWO-PHASE FLOWS. Topical rept. no. 1.
Raphael Moissis. 18 Apr 62, 26p
Contract AT(30-1)2907
Rept. no. 304
OTS $2.60

IDO-19313
General Electric Co., Idaho Falls.
ADDITIONAL ANALYSIS OF THE SL-1 EXCURSION. Final progress rept. Jul-Oct 62. 21 Nov 62, 176p
Contract AT(10-1)1095
OTS $2.75

GEAP-3899
General Electric Co., San Jose, Calif.
BURNOUT CONDITIONS FOR SINGLE ROD IN ANNULAR GEOMETRY, WATER AT 600 TO 1400 PSIA
E. Janssen and J. A. Kervinen. Feb 63, 159p
Contract AT(04-3)189
OTS $2.75

GEAP-3888
General Electric Co., San Jose, Calif.
SODIUM COOLED REACTORS PROGRAM. FAST CERAMIC REACTOR DEVELOPMENT PROGRAM Quarterly rept. no. 1, Oct-Dec 61.
F. J. Leitz, ed. 15 Aug 63, 168p
Contract AT(04-3)189
OTS $2.75

GNEC-141(Del.)
General Nuclear Engineering Corp., Dunedin, Fla.
GAS-COOLED REACTOR PROJECT. Progress rept. no. 7. 15 Sep 60, declassified 7 Mar 61. 229p
Contract [AT(38-1)200]
OTS $15.00

HW-72666
Hanford Atomic Products Operation, Richland, Wash.
HOT SEMIWORKS STRONTIUM-90 RECOVERY PROGRAM. 17 Jul 63, 176p
Contract AT(45-1)1350
OTS $2.75

HW-73959
Hanford Atomic Products Operation, Richland, Wash.
IRRADIATION EFFECTS IN URANIUM DIOXIDE SINGLE CRYSTAL
J. L. Bates, J. A. Christensen and J. L. Daniel. Sep 62, 24p
Contract AT(45-1)1350
OTS $0.75

HW-69234
Hanford Atomic Products Operation, Richland, Wash.
IRRADIATION EFFECTS ON URANIUM DIOXIDE MELTING
J. A. Christensen. Mar 62, 27p
Contract AT(45-1)1350
OTS $0.75

HW-78388
Hanford Atomic Products Operation, Richland, Wash.
RESEARCH AND DEVELOPMENT PROGRAMS EXECUTED FOR THE DIVISION OF REACTOR DEVELOPMENT. Quarterly progress rept. Apr-Jun 63.
M. M. Hendrickson and J. K. Green, ed. Jul 63, 135p
Contract AT(45-1)1350
OTS $2.50

HW-66666(Rev. 2)
Hanford Atomic Products Operation, Richland, Wash.
REVIEW OF POWER AND HEAT REACTOR DESIGNS DOMESTIC AND FOREIGN
E. R. Appleby, comp. Oct 63, 300p
Contract AT(45-1)1350
OTS $4.50

NYO-9992
Jackson and Moreland, Inc., Boston, Mass.
EURATOM REACTOR FUEL MANAGEMENT PROGRAM. PART III FUEL CYCLE ANALYSIS. Final rept. Jan 63, 108p
Contract AT(30-1)2875
OTS $2.25

N64-13280
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CRITICALITY CALCULATIONS FOR A FAST LIQUID-METAL-COOLED REACTOR-PHASE I
H. G. Gronroos. 15 Nov 63, 27p
Contract NAS7-100
Technical rept. no. 32-512; NASA-CR-53017
OTS $2.60

N63-21994
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FLUX TO DOSE RATE CONVERSION FACTORS FOR GAMMA RAY EXPOSURE
Joseph H. Smith. 27 Apr 63, 9p
Contract NAS7-100
Technical rept. no. 32-439; NASA CR-50761
OTS $1.10

TID-14537
Los Alamos Scientific Lab., N. Mex.
DELAYED NEUTRON ECONOMY AND CONTROL IN A DIRECT CONTACT CORE LIQUID METAL FUELED REACTOR
Richard M. Bidwell. 16 Jan 62, 21p
Contract W7405-eng-36
LADC 5159
OTS $2.60

LAMS-3021
Los Alamos Scientific Lab., N. Mex.
LAMPRE PROGRAM. Quarterly status rept. for period ending 20 Nov 63. Dec 63, 19p
Contract W7405-eng-36
OTS $0.50

LAMS-3023
Los Alamos Scientific Lab., N. Mex.
SOLID PLUTONIUM FUELS PROGRAM. Quarterly status rept. 1 Jul-30 Sep 63.
J. A. Leary, W. J. Maraman, W. N. Miner, and F. W. Schonfeld. Oct 63, 7p
Contract W7405-eng-36
OTS $0.50

MND-2903(Vol. II)
Martin-Marietta Corp., Baltimore, Md.
FEASIBILITY STUDY OF WATER-COOLED THERMIONIC NUCLEAR POWER PLANT. Nov 62, 109p
Contract AT(30-1)2990
OTS $2.25

MND-P-2977
Martin-Marietta Corp., Baltimore, Md.
PRODUCTION OF STRONTIUM-TITANATE RADIOISOTOPE FUEL FOR SNAP 7B THERMOELECTRIC GENERATOR
Justin L. Bloom. 15 Apr 63, 87p
Contract AT(30-1)3062
OTS $2.00

TID-18323
Martin-Marietta Corp., Baltimore, Md.
RADIOISOTOPE-FUELED POWER SUPPLIES
J. G. Morse. 1961, 133p
Contract AT(30-3)217
OTS $10.50

Lecture presented at University of California, Los Angeles, California, UCLA Short Course, Space Power Systems, July 17-28, 1961.

ORNL-TM-476
Oak Ridge National Lab., Tenn.
ANALOG COMPUTER CALCULATIONS FOR THE LOSS-OF-POWER INCIDENT IN THE EGCR
C. S. Walker. 5 Feb 62, 62p
Contract [W7405-eng-26]
OTS $6.60

IDO-16914
Phillips Petroleum Co., Idaho Falls.
EFFECTS OF TRANSIENT NUCLEAR RADIATION ON TRANSDUCERS AND ELECTRICAL CABLES
F. D. Terry. 30 Nov 63, 32p
Contract AT(10-1)205
OTS $0.75

IDO-16934
Phillips Petroleum Co., Idaho Falls.
FUEL ELEMENT DEVELOPMENT FOR FY 1963. Annual progress rept.
G. W. Gibson, M. J. Graber, and W. C. Francis. 25 Nov 63, 63p
Contract AT(10-1)205
OTS $1.50

IDO-16886
Phillips Petroleum Co., Idaho Falls.
NON-DESTRUCTIVE AND DESTRUCTIVE TRANSIENT TEST OF THE SPERT I-D, FULLY ENRICHED, ALUMINUM-PLATE-TYPE CORE. Data summary rept.
M. R. Zeissler. 27 Nov 63, 70p
Contract AT(10-1)205
OTS $1.50

IDO-16917
Phillips Petroleum Co., Idaho Falls.
MATERIALS TESTING REACTOR-ENGINEERING TEST REACTOR TECHNICAL BRANCHES. Quarterly rept. 1 Apr-30 Jun 63. 18 Nov 63, 49p
Contract AT(10-1)205
OTS $1.25

IDO-16906
Phillips Petroleum Co., Idaho Falls.
SPERT I LOW ENRICHMENT OXIDE CORE DESTRUCTIVE TEST PROGRAM SAFETY ANALYSIS REPORT
J. E. Grund and B. E. Norton. 30 Aug 63, 123p
Contract AT(10-1)205
OTS $2.50

SC-DC-3553
Sandia Corp., Albuquerque, N. Mex.
PROCEEDINGS OF THE CONFERENCE ON AEROSPACE NUCLEAR SAFETY HELD AT THE TRINITY SECTION, AMERICAN NUCLEAR SOCIETY NATIONAL TOPICAL MEETING, ALBUQUERQUE, NEW MEXICO, OCTOBER 1-4, 1963
R. E. Dunlap, ed. Jan 64, 366p
Contract AT(29-1)789
OTS $4.50

DP-838
Savannah River Lab., Aiken, S. C.
COMMERCIAL FABRICATION OF PLUTONIUM FUEL
A. A. Johnson, J. E. Crawley, J. M. Hoffmann, R. T. Huntoon, and D. A. Orth. Jun 63, 109p
Contract AT(07-2)1
OTS $2.25

DP-875
Savannah River Lab., Aiken, S. C.
HEAVY WATER MODERATED POWER REACTORS.
Progress rept. Sep-Oct 63.
R. R. Hood, comp. Dec 63, 43p
Contract AT(07-2)1
OTS $1.00

DP-859
Savannah River Lab., Aiken, S. C.
IRRADIATION OF TANDEM-EXTRUDED JOINTS BETWEEN ZIRCALOY AND STAINLESS STEEL
J. Walter Joseph, Jr. Oct 63, 16p
Contract AT(07-2)1
OTS $0.50

DP-777
Savannah River Lab., Aiken, S. C.
MEASURED LATTICE PARAMETERS FOR NATURAL URANIUM METAL AND LATTICES IN D_2O
T. J. Hurley, Jr. Aug 63, 46p
Contract AT(07-2)1
OTS $1.00

DP-864
Savannah River Lab., Aiken, S. C.
THORIUM-FUELED D_2O-MODERATED POWER REACTORS
Dale F. Babcock, Ramon R. Hood, and Daniel S. St. John, comp. Dec 63, 40p
Contract AT(07-2)1
OTS $1.00

SRIA-43
Stanford Research Inst., Menlo Park, Calif.
CONTAINMENT OF FRAGMENTS FROM A RUNAWAY REACTOR. Technical rept. no. 5.
N. B. Botsford, D. D. Keough, and R. W. White.
2 Dec 63, 132p
Contract AT(04-3)115
SRI Proj. no. GSU-2164
OTS $2.50

WCAP-1607
Westinghouse Electric Corp., Pittsburgh, Pa.
MIXING IN FLOW PARALLEL TO ROD BUNDLES HAVING A SQUARE LATTICE
P. A. Nelson, A. A. Bishop, and L. S. Tong. Jul 60, 27p
OTS $2.60

Nuclear Reactions

BNL-6646
Brookhaven National Lab., Upton, N. Y.
A SIMPLE THEORY OF THE PROCESS $p+p \longrightarrow d+\omega^+$
Preliminary version.
Jeremy Bernstein. Aug 62, 12p
Contract AT(30-2)GEN-16
OTS $1.60

UCRL-11049
Lawrence Radiation Lab., Univ. of California, Berkeley.
THE ISOMER RATIO OF Ce^{137m} - Ce^{137g} PRODUCED IN SEVERAL CHARGED-PARTICLE REACTIONS
Richard Leslie Kiefer Doctoral thesis. 17 Oct 63, 89p
Contract W7405-eng-48
OTS $2.00

PHYSICS

BNL-5673
Brookhaven National Lab., Upton, N. Y.
THE MAGNETIC FORM FACTOR OF NICKEL OXIDE
Harvey A. Alperin. 6 Nov 61, 13p Prepared in cooperation with Naval Ordnance Lab.
Contract AT(30-2)GEN-16
OTS $1.60

NASA-TN-D-2244
Canterbury Univ., Christchurch, (New Zealand)
RADAR INVESTIGATION OF METEORS AT HIGH RATES OF DETECTION
C. Ellyett, C. S. L. Keay, and E. C. McLauchlan. Jan 64, 43p
Grant NsG-219-62
N64-13157
OTS $1.25

PB-165 049
Defense Research Lab., Univ. of Texas, Austin.
STUDIES ON LONGITUDINAL AND BENDING WAVES IN LONG ELASTIC RODS
H. J. Plass, Jr. and C. C. Steyer. 24 Apr 56, 135p
Contract NOrd-16498
DRL-376; CM-860
OTS $10.50

DESCRIPTORS: Elasticity, *Rods, *Mechanical waves, Propagation, Deformation, Stresses, Numerical analysis, Theory, Differential equations,

The simplest approximate traveling wave theory is that which describes the longitudinal waves in a long rod resulting from an axial disturbance applied to the end of the rod. The present report covers primarily the theoretical phase of the project, although some experimental results are included for comparison purposes. (Author)

LAMS-2944
Los Alamos Scientific Lab., N. Mex.
NUMERICAL STUDIES OF THE THETA PINCH
T. A. Oliphant, Jr. Jul 63, 87p
Contract W7405-eng-36
OTS $2.00

K-1584
Oak Ridge Gaseous Diffusion Plant, Tenn.
SCATTERING OF MOLECULES FROM SURFACES: THE EFFECT OF APPARATUS MISALIGNMENT ON THE DIRECTION AND INTENSITY OF INCIDENT AND SCATTERED MOLECULES
J. C. Crews. 14 Jan 64, 21p
Contract W7405-eng-28
OTS $0.50

PUC-1962-68
Palmer Physical Lab., Princeton Univ., N. J.
A NEW EXPERIMENTAL LIMIT ON THE VELOCITY DEPENDENT INTERACTION BETWEEN NATURAL CLOCKS AND DISTANT MATTER
Kenneth Clyde Turner. Thesis. Apr 62, 89p
Contract AT(30-1)937
OTS $8.10

NYO-10230
Rochester Univ., N. Y.
ON "META"-RELATIVITY
O. M. P. Bilaniuk, V. K. Deshpande, and E. C. G. Sudarshan. 1 Apr 62, 25p
Contract AT(30-1)875
OTS $2.60

Electricity and Magnetism

PB-165 068
[Aerial Reconnaissance Lab., Aeronautical Systems Div.] Wright-Patterson AFB, Ohio.
SINGLE-ENDED PHASE EQUALIZERS. Rept. on Radar Presentation Intelligence
Daniel Levine. Apr 52, 55p
WADC Technical rept. 52-91; AD-61 221
OTS $5.60

DESCRIPTORS: *Electrical networks, Broadband, *Phase distortion, Mathematical analysis, Determinants, Phase shifters.

A single ended phase equalizer is analyzed in detail, starting with the general equivalent circuit. The complex gain expression is derived from the nodal equations, and then the necessary approximations involved in order to make a wideband phase equalizer are developed. The nature of the phase equalization curves for several networks are discussed with the aid of a number of typical phase curves. Following a review of network theory as it applies to this circuit, the equivalence of equalizers having a given number of elements is explained. It is shown that if a reactance network of k elements provides an equalizer having a phase difference between the initial ($\omega = 0$) and final ($\omega \to \infty$) phases of $k\pi$, then any other reactance network of k elements provides a phase curve that can be duplicated either by the initial network or by a network having less than k elements. (Author)

PB-165 090
Electrical Engineering Research Lab., Univ. of Illinois, Urbana.
THE APPLICATION OF MATHEMATICAL LOGIC TO NETWORK THEORY. Interim technical rept. no. 9
Wataru Mayeda (Doctoral thesis). 30 Apr 58, 65p
Contract DA11-022-ORD-1983
AD-159 741
OTS $6.60

DESCRIPTORS: *Mathematical logic, *Electrical networks, *Topology, Networks, Theory, Matrix algebra, Admittance.

A new technique is presented which is the outgrowth of research in network topology. The set consisting of $y_1, y_2, \ldots, y_k$ is called a circuit set if the elements $y_1, y_2, \ldots, y_k$ form a circuit in a network. A large number of circuit sets can be formed by the elements in a network, but there exist exactly e-v+1 linearly independent circuit sets in a network having e elements and v vertices. The set consisting of the elements $y_a, y_b, \ldots, y_p$ is called a path set if $y_a, y_b, \ldots, y_p$ form a path between the vertices i and j in a network. If P_1 and P_2 are path sets between the vertices i and j in a network, then $P_1 + P_2$ is a circuit set where + represents the operation called the ring sum. There exist, at most, e-v+2 linearly independent path sets between the vertices i and j in a network. If $P_1, P_2, \ldots, P_m$ are all the possible sets, each of which is either a path set between i and j, a circuit set, or a union of sets consisting of one path set and circuit sets in a network, then there exist exactly e-v+2 linearly independent sets in $P_1, P_2, \ldots, P_m$. By knowing these e-v+2 linearly independent sets, the driving point functions of a network can be formed. The synthesis of all possible networks satisfying the given sets representing all terms in the numerator or the denominator of a driving point impedance (admittance) function can be accomplished. (DDC abstract) (See also AD-138 175)

Electronics

UCRL-6820
Lawrence Radiation Lab., Univ. of California, Livermore.
THE EFFECT OF BAND STRUCTURE ON THERMIONIC EMISSION.
W. E. Spicer. 13 Mar 62, 21p
Contract W7405-eng-48
OTS $2.60

NASA-TN-D-2078
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
FIELD EMISSION CHARGING OF METALLIC COLLOIDS
N. Stankiewicz, Dec 63, 27p
N64-12106
OTS $0.75

LAMS-3004
Los Alamos Scientific Lab., N. Mex.
LASL CONTROLLED THERMONUCLEAR RESEARCH PROGRAM. Semiannual status rept. for period ending 20 Oct 63. Nov 63, 127p
Contract W7405-eng-36
OTS $2.50

LA-2978
Los Alamos Scientific Lab., N. Mex.
OPERATING CHARACTERISTICS OF A FAST ELECTROMAGNETICALLY OPERATED GAS VALVE
E. A. Knapp and A. H. Williams. 20 Jun 63, 20p
Contract W7405-eng-36
OTS $0.50

TID-18540
New York Univ., N. Y.
THE USE OF ATOMIC BEAMS AS A PROBE FOR STUDYING LOW DENSITY PLASMAS. Quarterly progress rept. 1 Jan-31 Mar 63. 29 Apr 63, 8p
Contract AT(30-1)2397
OTS $1.10

MATT-114
Plasma Physics Lab., Princeton Univ., N. J.
AN EVALUATION OF KADOMTSEV'S THEORY OF PLASMA TURBULENCE
Arthur F. Kuckes. Mar 62, 27p
Contract AT(30-1)1238
OTS $2.60

MATT-196
Plasma Physics Lab., Princeton Univ., N. J.
A STUDY OF THE STRUCTURE OF PLASMOIDS GENERATED BY AN ELECTRODELESS PLASMA GUN
Daniel R. Wells. 12 May 63, 135p
Contract AT(30-1)1238
OTS $2.50

Molecular Physics and Spectroscopy

TID-15853
Argonne National Lab., Ill.
AN AUTOMATIC RAPID SCANNING SPECTROPHOTOMETER TO STUDY THERMOLUMINESCENCE SPECTRA
A. K. Ghosh. Apr 62, 10p
Contract W31-109-eng-38
UAC-6278
OTS $1.10

TID-18543
Wisconsin Univ., Madison.
MOLECULAR QUANTUM MECHANICS. Final technical progress rept. 1 Jul 54-31 Mar 63.
Joseph O. Hirschfelder. 13 May 63, 12p
Contract AT(11-1)298
OTS $1.60

Optics

PB-165 039
Naval Ordnance Test Station, China Lake, Calif.
MODIFICATIONS AND ADDITIONS TO THE NOTS GENERAL OPTICAL RAY TRACING COMPUTER PROGRAM
G. W. Shavlik. Sep 62, 38p
NOTS TP 3011; NAVWEPS rept. 7966
OTS $3.60

DESCRIPTORS: *Optical scanning, Geometric forms, Equations, *Programming (Computers),

The general optical ray tracing computer program at NOTS has been modified to provide ray tracing through aspheres and circular cylinders, cones, and toroids. This report presents two methods of determining the shape of aspheric interfaces to minimize spherical aberration, a method of computing aberrations, and various ways in which spot diagrams are obtained. Also described are three auxiliary programs, one for computing the ray input for spot diagrams, a second for aspheric coefficient scaling, and a third for computing an aspheric curve through a known set of points. A reprint of a pertinent article by William A. Allen and John R. Synder published in the Journal of the Optical Society of America is appended. (Author)

MATT-187
Plasma Physics Lab., Princeton Univ., N. J.
CLADDED LAMINAR OPTICS FOR THE ULTRAVIOLET
J. G. Hirschberg. Apr 63, 6p
Contract AT(30-1)1238
OTS $1.10

TID-3911(Rev.1)
Texas A. and M. Coll., College Station.
THERMOLUMINESCENCE. Bibliography.
Ernest E. Angino and N. Grogler (Physikalisches Institut, Universitat Bern) 31 Oct 63, 44p
OTS $1.00

Solid State Physics

AD-293 497
Barus Research Lab. of Physics, Brown Univ., Providence, R. I.
STUDY OF SURFACE PROPERTIES OF AUTOMATICALLY-CLEAN METALS AND SEMICONDUCTORS.
Final technical rept., 1 Feb 59-31 Aug 62
H. E. Farnsworth, J. Marsh, and D. Shooter. Oct 62, 47p
Contract DA36-039-sc-78286
OTS $4.60

DESCRIPTORS: *Metals, *Semiconductors, Surface properties, *Germanium, Crystals, *Diamonds, Deuterium, Hydrogen, Decontamination, Graphic analysis, Electron diffraction analysis, Cleaning.

This report includes:
A search for hydrogen-deuterium exchange on clean germanium surfaces, pub. in the Jnl. of Physical Chemistry 66:222-224, 1962
Investigation of (100) and (111) surface to semiconducting diamond by low-energy energy electron diffraction (See also AD-263 155)

N64-13197
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
METALLURGICAL EXAMINATION OF DEVELOPMENT-TYPE THERMIONIC POWER CONVERTERS
E. C. Bernett. 15 Dec 63, 23p
Contract NAS7-100
Technical rept. no. 32-548; NASA CR-55211
OTS $2.60

UCRL-11017
Lawrence Radiation Lab., Univ. of California, Berkeley.
THE INTERNAL FRICTION DUE TO OXYGEN IN SILVER
John Mesrob Papazian. Master's thesis. Sep 63, 57p
Contract W7405-eng-48
OTS $1.50

NASA-TR-R-186
Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio
ON THE MECHANISM OF DUCTILE BENDING IN IONIC CRYSTALS
Charles E. May, Dec 63, 11p
N64-12108
OTS $0.50

Theoretical Physics

TID-15795
Argonne National Lab., Ill.
THERMODYNAMIC PROPERTIES OF ZrH_2, ZrD_2, YH_2, AND YD_2
Howard E. Flotow and Darrell W. Osborne. 27 Mar 62, 29p
Contract W31-109-eng-38
UAC-6256
OTS $2.60

TID-18569
Los Alamos Scientific Lab., N. Mex.
STABILITY OF VISCOUS FLOW HEAT EXCHANGE
Conrad Longmire. 11 Jul 55, 8p
Contract W7405-eng-36
OTS $1.10

AD-276 253
Massachusetts Inst. of Tech., Cambridge.
SOME ANALYTICAL AND EXPERIMENTAL STUDIES OF HEAT TRANSFER WITH GAS DISSOCIATION.
Final rept., 1 Sep 58-30 Nov 60, on Basic Research on Ablation Processes
George A. Brown and John D. Christie
Contract DA19-020-ORD-4709
D. S. R. Proj. 8017; AROD no. 2164:2
OTS $6.60

DESCRIPTORS: *Heat transfer, Laminar flow, Dissociation, *Iodine, Gases, Vapors, Flat plate models, Instrumentation, Thermocouples, *Ablation, Thermodynamics.

An apparatus was designed to obtain accurate experimental heat-transfer data for the laminar flow of dissociating iodine vapor in a circular tube. Successful tests were made to determine corrosion-resistant materials and sealing techniques for use with iodine. Due to termination of the study the apparatus was not constructed. Preliminary experiments were made on a natural-convection heat-transfer apparatus with iodine. The results demonstrate the usefulness of such experiments in heat-transfer research involving gas dissociation. An exact solution was obtained for compressible laminar flow of dissociating iodine vapor over a flat plate with simultaneous heat and mass transfer. The results of this solution were in excellent agreement with available approximate solutions and confirmed approximate engineering relationships which are currently in use. (Author)

PB-165 065
Materials Lab., [Aeronautical Systems Div.] Wright-Patterson AFB, Ohio.
DESIGN FOR A PRIMARY STANDARD RADIOMETER.
Rept. on Materials Analysis and Evaluation Technique
Sven R. Hartmann and Walter R. Burrus. Mar 56, 19p
WADC Technical note 56-102; AD-94 658
OTS $1.60

DESCRIPTORS: *Radiometers, Design, Thermal radiation, Instrumentation.

An instrument design has been developed to measure the irradiance of intense thermal radiation with high accuracy and fast response without the attending necessity of calibration. A conical receiver mounted in a heat sink is made part of an amplitude limiting network in a Wien Bridge oscillator. Changes in the intensity of the incident thermal radiation are then compensated for by changes in the electrical power delivered by the Wien Bridge oscillator. The temperature of the detector, therefore, is constant minimizing the effect of heat losses. (Author)

PB-165 058
Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
TRANSPORT PROPERTIES OF NITROGEN, HYDROGEN, OXYGEN, AND AIR TO 30,000°K
Jerrold M. Yos. 22 Mar 63, 70p
Contract AF33(616)7578
Technical memo. RAD-TM-63-7; N63-16525
OTS $6.60

DESCRIPTORS: *High temperature research, *Nitrogen, *Oxygen, *Hydrogen, *Air, *Transport properties, Viscosity, Thermal conductivity, Electrical conductance, Diffusion, Atmosphere entry, Plasma physics,

The viscosity, thermal conductivity, electrical conductivity, binary diffusion coefficients, and total radiated power in the continuum have been calculated for hydrogen, nitrogen, oxygen, and air for temperatures from 1000 to 30,000°K and for pressures from 1 to 30 atm. The viscosity, electrical and thermal conductivities, and diffusion coefficients were calculated from the first Chapman-Enskog approximation using the best available cross-section data from the literature. Coulomb collisions were treated approximately by means of effective collision cross sections, chosen to make the calculated transport properties agree with the results of Spitzer and Härm for the fully ionized case. Effects of ambipolar diffusion and charge exchange were included in the calculation. The continuum radiated power was calculated from Kramers' semiclassical approximation with an empirical correction factor to make the results agree with the limited experimental data available in the range of interest. (Author)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB-165 089
Arnold Engineering Development Center [Arnold Air Force Station, Tenn.].
PRELIMINARY PLANNING FOR A HYPERVELOCITY AEROBALLISTIC RANGE AT AEDC
E. J. Stollenwerk and R. W. Perry. Jun 58, 21p
Contract AF40(600)700
Rept. no. AEDC TN-58-25; AD-157 144
OTS $2.60

DESCRIPTORS: *Site selection, *Test facilities, *Exterior ballistics, Ranges (Establishments), Hypervelocity projectiles, Hypervelocity guns, Telemeter systems.

Results of preliminary experiments aimed at defining the design of a hypervelocity aeroballistic range for the AEDC are reported and future possibilities discussed. As a first step toward telemetering from a projectile, an oscillator capable of withstanding a 200,000g acceleration has been developed. Scale-up of a hypervelocity gun using spark-heated hydrogen or helium as the propellant is also in progress. Ten million joules of electric energy storage are presently available for this work, and air has already been heated to temperatures beyond 20,000°K by such constant-volume spark-heating. (Author)

Communication Theory

NASA-TR-R-189
Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
PULSE-FREQUENCY-MODULATION TELEMETRY
Robert W. Rochelle. Doctoral thesis. Jan 64, 58p
N64-12695
OTS $1.50

N63-23043
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
CORRELATION PROPERTIES OF CYCLIC SEQUENCES
Robert C. Titsworth. 1 Jul 63, 88p
Contract NAS7-100
Technical rept. no. 32-388; NASA CR-51586
OTS $8.10

AD-405 622
Lincoln Lab., Mass. Inst. of Tech., Lexington.
A NOTE ON POWER REQUIREMENTS FOR DIGITALIZED VOICE TRANSMISSION
B. Reiffen. 6 May 63, 12p
Contract AF19(628)500
Rept. no. 65G-1; ESD-TDR-63-60
OTS $1.60

DESCRIPTORS: *Digital systems, *Speech transmission *Voice communication systems, Communications theory, Correlation techniques, Modulation, Errors, Probability, Noise (Radio), Signal-to-noise ratio, Radiofrequency power

A digital communication system is analyzed under the following assumptions: (1) ℓ equals energy orthogonal signals are used; (2) the channel adds white, gaussian noise; and (3) the receiver used band-pass correlation followed by envelope detection. Curves are presented which permit this system, when used for transmitting digitalized speech, to be compared to analog modulation systems, the comparison being with respect to required signal power. In an appendix is a discussion of the error probabilities and rates for the digital communication system in the light of the critical rate for the channel. (Author)

AD-407 512
Lincoln Lab., Mass. Inst. of Tech., Lexington.
VOCODED SPEECH
Bernard Gold. 7 May 63, 26p
Contract AF19(628)500
Rept. no. 62G-1; ESD-TDR-63-67
OTS $2.60

DESCRIPTORS: *Speech compression, Speech, Speech recognition, Analysis, Synthesis, Spectrum analyzers, Band-pass filters, Coding, Voice communication systems,

An introduction to vocoders is presented. An elementary discussion of speech fundamentals is followed by a brief description of the different branches of speech research work. Explanations are presented of channel vocoders, voice-excited vocoders and, finally, the vocoder built for this research. (Author)

SOCIAL SCIENCES

PB-165 038
Bureau of Applied Social Research, Columbia Univ., New York.
A GUIDE FOR INTELLIGENCE INTERVIEWING OF VOLUNTARY FOREIGN SOURCES
Bernard Levenson and Kurt Back. Dec 54, 60p
Contract AF 33(038)14313
Technical memo. OERL-TM-54-4; AD-77 564
OTS $5.60

DESCRIPTORS: *Military intelligence, *Handbooks

PB-165 045

Ohio State Univ. Research Foundation, Columbus.
INDIRECT OBJECT CONSTRUCTIONS IN ENGLISH AND THE ORDERING OF TRANSFORMATIONS.
Rept. no. 1, 1 Jul 61-31 Jan 62, on Syntactic Analysis
Charles J. Fillmore. 13 Feb 62, 53p
Grant NSF-G18609
RF Proj. 1303
OTS $5.60

DESCRIPTORS: *Language, *Syntax, Machine translation *English language.

The study is a contribution to the transformational grammar of English. Its primary purpose was to construct and to incorporate within the gammar of English the means for correctly generating sentences containing indirect objects. Two types of indirect object constructions are considered: he gave me an umbrella;

he bought me an umbrella. Phrase structure and transformational rules were constructed to deal with these constructions. The position of the latter rules within the general transformational structure of English is discussed in detail. In the course of the presentation several re-orderings and reformulations of rules in existing statements of the grammar of English will be shown to be advisable. Some of these changes are consequences of the attempt to introduce the indirect-object rules; other are independently motivated. A particularly important consequence of the incorporation of indirect-object rules into the grammar is the splitting up and separation of the rule by which the morpheme wh is attached to a nominal or adverbial element--an optional rule--and the obligatory rule by which the wh nominal or wh adverbial is moved to the front of the sentence. (Author)

PB-165 046

Ohio State Univ. Research Foundation, Columbus.
SYNCHRONIC STUDIES IN MANDARIN GAMMER. A SELECTED BIBLIOGRAPHY. Rept. no. 2, 1 Jul 61-31 Jan 62, on Syntactic Analysis
William S-Y. Wang. Feb 62, 17p
Grant NSF-G18609
RF Proj. 1303
OTS $1.60

DESCRIPTORS: *Bibliographies, *Language, *Syntax, Machine translation.

A set of references is given which deal with the gammar of Mandarin Chinese. The term "gammar" is used in the broad sense to include syntax, morphemics, morphophonemics, phonemics and phonetics. The references are alphabetized according to the last name of the first author. Names of Chinese authors and of works written in Chinese have been transliterated into Yale romanization. (See also PB-165 045)

Documentation

PB-165 014
Planning Research Corp., Los Angeles, Calif.
AUTOMATIC INDEXING AND ABSTRACTING OF THE CONTENTS OF DOCUMENTS. Final rept.
H. P. Edmundson, V. A. Oswald, Jr., and R. E. Wylls.
31 Oct 59, 133p
Contract AF30(602)1748
Rept. no PRC R-126; RADC-TR-59-208; AD-231 606
OTS $10.50

DESCRIPTORS: *Documentation, Automatic, *Abstracts, Theory, Tables,

In preparation for the widespread use of automatic scanners which will read documents and transmit their contents to other machines for analysis, the results are presented of an experiment in automatic indexing and automatic abstracting, together with theoretical studies that introduce a new concept in auto-analysis: the relative-frequency approach to measuring the significance of words, word groups, and sentences. The experiment is based on the fact that significant words in a document occur not only in isolation (uniterms) but also in patterns of juxtaposition (multiterms). The frequency of uniterms and multiterms was used in the experiment as a function for the production of frequency-ordered indexes (auto-indexes), and the frequency of multiterms was used as a function for the production of automatic abstracts (auto-abstracts), significant passages from documents in the author's own language. The theoretical studies present for the first time the relative frequency approach to problems of auto-analysis and discuss in detail its application to problems of auto-indexing, auto-abstracting, and fact correlation. Conclusions are drawn from the experiment and from the theoretical studies that point toward more sophisticated mathematical and linguistic techniques for the solution of problems of auto-analysis. (Author)

MISCELLANEOUS

PB-181 560
Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Jan 64
OTS $1.25, $10/year

DESCRIPTORS: *Naval research, Scientific research, Galaxies, Astronomy, Chemistry, Magnesium compounds, Oxides, Vanadium compounds, Scale, Plastic coatings, Liquids, Trypsin, Electrodes, Atmosphere, Purification, Controlled atmospheres, Electricity, Mechanics, Determinants, Equations, Thermal conductivity, Quartz, Metallurgy, Ceramic materials, Fracture (Mechanics), Hydrogen, Palladium, Ferromagnetic materials, Thin films, Steel, Brass, Sea water, Radio, Lasers, Antennas, Arsenides,

Contents:
Articles:
Galactic X-Ray Astronomy, by S. Bowyer and others
Automatic Computation and Plotting of Spectral Response Data, by R. J. Lambert

Scientific Program:
Chemistry: Proposed phase diagram for the system magnesium oxide-vanadium pentoxide. X-ray spectrograph constructed to identify elements in oil-ash deposits taken from Naval boilers. Hydrophobic and oleophobic fluoropolymer coatings of extremely low surface energy. Study of autophobic liquids on platinum by the contact potential method. A force-area study of mixed films of trypsin and ovomucoid. Electrolytic cell for x-ray diffraction studies of electrode phenomena. Third annual progress report on the present status of chemical research in atmosphere purification and control on nuclear-powered submarines. New instrument monitors total hydrocarbon content in the closed atmosphere of nuclear-powered submarines.
Electricity: System for measuring the Seebeck coefficient and resistivity.
Mechanics: On the characteristic values of determinants and matrices. Note on the error in the Newton-Raphson method for finding the real roots of algebraic equations. Time reversal in heat conduction. Transit time for ultrasonic waves in fused quartz.
Metallurgy and Ceramics: Electron fractographic observations relating to the events that occur during the early stages of the fracture of smooth bar tensile specimens. Heat capacity and spontaneous heating of H-Pd at liquid helium temperatures. Effects of He^3 irradiation on the magnetic properties of ferromagnetic thin films. Limitations on trace analysis methods. Development of high-strength structural steels. Cathodic polarization effects on brass in sea water.

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